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I. C. ENGINE EMISSION TESTS AT  
SOUTHERN CALIFORNIA GAS GOLETA STATION UNIT #7

October 12, 1992

Prepared for:

Southern California Gas Company  
Test Center  
P.O. Box 3249  
Terminal Annex  
Los Angeles, California 90051

October 1992

Prepared by:

Steiner Environmental, Inc.  
4930 Boylan Street  
Bakersfield, California 93308

Report PS-92-2925/Project 7253-92

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## SECTION 1

### INTRODUCTION

At the request of Southern California Gas Company, Steiner Environmental, Inc. conducted a series of emission tests at Southern California Gas Company's Goleta Station. The purpose of these tests was to demonstrate compliance with Santa Barbara County APCD Rules and Regulations for one IC engine (Unit #7) which was recently repaired. The tests were conducted on October 12, 1992.

Southern California Gas Company operates IC engines at their Goleta Station. These engines are used to inject gas into the Goleta natural gas storage field. Four Ingersol-Rand LVG 8-cylinder engines and three Ingersol-Rand LVG 6-cylinder engines are equipped with NO<sub>x</sub> control catalysts and air-to-fuel ratio controllers. Engine #7 is a 6-cylinder engine.

The purpose of these tests was to measure NO<sub>x</sub>, CO and ROC emission data at the outlet of the catalyst and NO<sub>x</sub> and O<sub>2</sub> emission data at the inlet of the catalyst when the air to fuel ratio controller was set at the optimum value. Triplicate 40-minute tests were conducted at the inlet and outlet simultaneously using EPA Method 20 to demonstrate 80% NO<sub>x</sub> reduction. ROC samples were also collected at the outlet only.

In addition to these tests, 10-minute tests were conducted with the AFR set at minimum, maximum and arbitrary values. This was to

demonstrate that the engine was in compliance throughout the normal operating range of the AFR. ROC samples were taken at the minimum and maximum setpoints.

The engine was operated with fuel mixture enriched, according to catalyst specifications. Fuel flowrate data were collected during each test. A fuel gas sample was collected and analyzed using ASTM methods. An F-Factor was calculated from the results of the fuel analysis and was used to determine 1b/MMBtu emission factors. Lb/hr data were calculated from the firing rate and emission factors.

Section 2 of this report presents the test matrix for this program.

## **SECTION 2**

### **TEST PROGRAM**

Table 2-1 presents the test matrix for Engine #7 with the AFR controller at minimum, maximum and arbitrary setpoints. Table 2-2 presents the test matrix with the AFR controller at optimum setpoint.

Section 3 summarizes the results of these tests.

TABLE 2-1. GOLETA STATION TEST MATRIX WITH AFR CONTROLLER AT MINIMUM/MAXIMUM/ARBITRARY SETPOINTS

Date	Engine Number	Test Location	Test Number	AFR Settings (millivolts)	Test Parameter	Test Time	Swing
10/12/92	7	Inlet	4	Maximum at Inlet AFR = 870	NO <sub>x</sub> , CO, CO <sub>2</sub> , O <sub>2</sub>	3:28 pm	866-870
		Outlet	4	Maximum at Outlet AFR = 870	NO <sub>x</sub> , CO, CO <sub>2</sub> , O <sub>2</sub> , HC	3:28 pm	866-870
		Outlet	5	Minimum at Outlet AFR = 825	NO <sub>x</sub> , CO, CO <sub>2</sub> , O <sub>2</sub> , HC	3:44 pm	801-843
		Inlet	5	Minimum at Inlet AFR = 825	NO <sub>x</sub> , CO, CO <sub>2</sub> , O <sub>2</sub>	3:44 pm	801-843
		Inlet	6	ARB Setpoint at Inlet AFR = 840	NO <sub>x</sub> , CO, CO <sub>2</sub> , O <sub>2</sub>	4:09 pm	841-846
		Outlet	6	ARB Setpoint at Outlet AFR = 840	NO <sub>x</sub> , CO, CO <sub>2</sub> , O <sub>2</sub>	4:09 pm	841-846

TABLE 2-2. GOLETA STATION TEST MATRIX WITH AFR CONTROLLER AT OPTIMUM SETPOINT

Date	Engine No.	Test Location	Test No.	AFR Setpoint	HP Rated	HP Actual	Test Parameter	Test Time
10/12/92	7	Inlet/Outlet	1	850 MW	660	654	NO <sub>x</sub> , CO, CO <sub>2</sub> , O <sub>2</sub> , HC	12:00 pm - 12:40 pm
		Inlet/Outlet	2		660	648	NO <sub>x</sub> , CO, CO <sub>2</sub> , O <sub>2</sub> , HC	1:45 pm - 2:25 pm
		Inlet/Outlet	3		660	643	NO <sub>x</sub> , CO, CO <sub>2</sub> , O <sub>2</sub> , HC	2:35 pm - 3:15 pm

## SECTION 3

### TEST RESULTS

Tables 3-1 and 3-2 summarize the results of the tests performed on Engine #7 with the AFR controller at the optimum setpoint. Tables 3-3 and 3-4 present the test results with the AFR set at minimum, maximum and arbitrary setpoints. Table 3-5 summarizes the NO<sub>x</sub> reduction efficiency for the engine catalyst. Greater than 80% NO<sub>x</sub> removal efficiency was achieved at all engine test points.

TABLE 3-1. SUMMARY OF EMISSIONS

PLANT : SO CAL GAS GOLETA  
 SOURCE : UNIT #7 INLET  
 DATE : OCT 12, 1992

Temp. Std. : 60 dF  
 Press. Std.: 29.92 in. Hg. 15 % O<sub>2</sub> Correction

	RUN 1	RUN 2	RUN 3	AVERAGE
Fuel Flow, scfh	5653.90	5643.53	5653.90	5650.44
Heat Input, MMBtu/hr	6.58	6.57	6.58	6.58
Horsepower	654	648	643	648
Oxygen, %	0.13	0.11	0.10	0.11
NO <sub>x</sub> , ppm	2142.86	2197.30	2082.88	2141.01
NO <sub>x</sub> , ppm @ O <sub>2</sub> corr.	608.71	623.57	590.82	607.70
NO <sub>x</sub> , lb/MMBtu	2.2332	2.2877	2.1675	2.2295
NO <sub>x</sub> , lb/hr	14.69	15.02	14.26	14.66
NO <sub>x</sub> , g/HP-hr	10.19	10.51	10.06	10.25
CO, ppm	4954.64	5108.59	4925.00	4996.08
CO, ppm @ O <sub>2</sub> corr.	1407.43	1449.77	1397.00	1418.07
CO, lb/MMBtu	3.1437	3.2383	3.1204	3.1675
CO, lb/hr	20.68	21.26	20.53	20.82
CO, g/HP-hr	14.34	14.88	14.48	14.57

TABLE 3-2. SUMMARY OF EMISSIONS

PLANT : SO CAL GAS GOLETA  
 SOURCE : UNIT #7 OUTLET  
 DATE : OCT 12, 1992

Temp. Std. : 60 °F  
 Press. Std.: 29.92 in. Hg. 15 % O<sub>2</sub> Correction

	RUN 1	RUN 2	RUN 3	<u>% Reduct.</u>	AVERAGE
Fuel Flow, scfh	5653.90	5643.53	5653.90		5650.44
Heat Input, MMBtu/hr	6.58	6.57	6.58		6.58
Horsepower	654	648	643		648
Oxygen, %	0.02	0.02	0.02		0.02
NOx, ppm	23.68	22.46	23.02	98.92%	23.05
NOx, ppm @ O <sub>2</sub> corr.	6.69	6.35	6.50		6.51
NOx, lb/MMBtu	0.0245	0.0233	0.0239		0.0239
NOx, lb/hr	0.16	0.15	0.16		0.16
NOx, g/HP-hr	0.11	0.11	0.11		0.11
CO, ppm	3488.16	3162.50	3051.95		3234.20
CO, ppm @ O <sub>2</sub> corr.	985.64	893.62	862.38		913.88
CO, lb/MMBtu	2.2016	1.9961	1.9263		2.0413
CO, lb/hr	14.48	13.11	12.67		13.42
CO, g/HP-hr	10.04	9.17	8.94		9.39
HC, ppm	36.48	25.98	36.36	15% O <sub>2</sub> Corr: Rule 333 ROC	32.94
HC, ppm @ O <sub>2</sub> corr.	10.31	7.34	10.27	250	9.31
HC, lb/MMBtu	0.0132	0.0094	0.0131		0.0119
HC, lb/hr	0.09	0.06	0.09		0.08
HC, g/HP-hr	0.06	0.04	0.06		0.05

TABLE 3-3. SUMMARY OF EMISSIONS

PLANT :	SO CAL GAS GOLETA	
SOURCE :	UNIT #7 IN HI-LOW	
DATE :	OCT 12, 1992	
Temp. Std. :	60 dF	
Press. Std. :	29.92 in. Hg.	15 % O <sub>2</sub> Correction

	HI	LOW	ARB
Fuel Flow, scfh	5653.90	5653.90	5653.90
Heat Input, MMBtu/hr	6.58	6.58	6.58
Horsepower	643	643	643
Oxygen, %	0.09	0.09	0.13
NOx, ppm	2005.75	2360.30	2272.57
NOx, ppm @ O <sub>2</sub> corr.	568.67	669.19	645.55
NOx, lb/MMBtu	2.0863	2.4550	2.3683
NOx, lb/hr	13.72	16.15	15.58
NOx, g/HP-hr	9.68	11.39	10.99
CO, ppm	6309.10	3464.84	4330.92
CO, ppm @ O <sub>2</sub> corr.	1788.74	982.34	1230.26
CO, lb/MMBtu	3.9955	2.1942	2.7480
CO, lb/hr	26.28	14.43	18.08
CO, g/HP-hr	18.54	10.18	12.75

TABLE 3-4. SUMMARY OF EMISSIONS

PLANT : SO CAL GAS GOLETA  
 SOURCE : UNIT #7 OUT HI-LO  
 DATE : OCT 12, 1992

Temp. Std. : 60 dF  
 Press. Std.: 29.92 in. Hg. 15 % O<sub>2</sub> Correction

	HI	LOW	ARB
Fuel Flow, scfh	5653.90	5653.90	5653.90
Heat Input, MMBtu/hr	6.58	6.58	6.58
Horsepower	643	643	643
Oxygen, %	0.02	0.02	0.02
NOx, ppm	25.61	18.01	20.22
NOx, ppm @ O <sub>2</sub> corr.	7.24	5.09	5.71
NOx, lb/MMBtu	0.0265	0.0187	0.0210
NOx, lb/hr	0.17	0.12	0.14
NOx, g/HP-hr	0.12	0.09	0.10
CO, ppm	4648.61	1341.69	2288.12
CO, ppm @ O <sub>2</sub> corr.	1313.54	379.12	646.55
CO, lb/MMBtu	2.9340	0.8468	1.4442
CO, lb/hr	19.30	5.57	9.50
CO, g/HP-hr	13.62	3.93	6.70
HC, ppm	38.16	36.12	
HC, ppm @ O <sub>2</sub> corr.	10.78	10.21	
HC, lb/MMBtu	0.0138	0.0131	
HC, lb/hr	0.09	0.09	
HC, g/HP-hr	0.06	0.06	

TABLE 3-5. NO<sub>x</sub> REDUCTION EFFICIENCIES  
Engine #7 - October 12, 1992

Test Number	Inlet NO <sub>x</sub> (ppm @ 15% O <sub>2</sub> )	Outlet NO <sub>x</sub> (ppm @ 15% O <sub>2</sub> )	NO <sub>x</sub> Reduction % <sup>A</sup>
1	608.71	6.69	99
2	623.57	6.35	99
3	590.82	6.50	99
Average	607.70	6.51	99
Minimum	669.19	5.09	99
Maximum	568.67	7.24	99
Arbitrary Point	645.55	5.71	99

$$A = NO_x \text{ Reduction Efficiency} = \frac{(NO_x @ 15\% O_2) \text{ inlet} - (NO_x @ 15\% O_2) \text{ outlet}}{(NO_x @ 15\% O_2) \text{ inlet}} \times 100$$

## SECTION 4

### SAMPLING EQUIPMENT AND PROCEDURES

This section of the report describes the equipment and procedures used for these tests.

#### 4.1 SAMPLING PROCEDURES FOR CONTINUOUS MONITORING

The continuous monitors used in the Steiner Environmental Mobile Monitoring Lab are shown in Table 4-1. Figure 4-1 is a schematic of the continuous monitoring system. The procedures used to continuously monitor stack gases for NO<sub>x</sub>, CO, CO<sub>2</sub>, and O<sub>2</sub> strictly follow EPA Method 20.

Sample was taken from the stack (at a single point) using a 316 stainless steel probe. A heated Balston filter holder and fiberglass filter (99.9999 percent efficiency retention of 0.6 micron particles) were connected to the outlet of the probe. Sample gas was transported through heated Teflon sample line (maintained at >250°F) by a Teflon-lined diaphragm pump to a 316 stainless steel refrigeration type conditioner (Hankison Model E-4G-SS). The sample gas was passed through the conditioner two separate times under vacuum before entering the pump, then two additional times under pressure. The clean, dry sample gas (approximately 35°F) was then transported to the continuous analyzer system through an unheated Teflon line. A series of flowmeters, valves,

**TABLE 4-1. CONTINUOUS MONITORING LAB - TRAILERS 1, 2 AND 4**

**NO<sub>x</sub> CHEMILUMINESCENT ANALYZER – THERMO ELECTRON MODEL 10**

Response Time (0-90%)	1.5 sec -- NO mode; 1.7 sec -- NO <sub>x</sub> mode
Zero Drift	Negligible after 1/2 hour warmup
Linearity	±1% of full scale
Accuracy	Derived from the NO or NO <sub>2</sub> calibration gas, ±1% of full scale
Output	0-10 V
Operating Ranges	0-2, 10, 25, 100, 250, 1000, 2500 and 10,000 ppm
Flowrate = 2 scfh	0-2.5

**O<sub>2</sub> ANALYZER, FUEL TYPE – TELEDYNE MODEL 326**

Response Time (0-90%)	60 seconds
Accuracy	±1% of scale at constant temperatures; ±1% of scale of ±5% of reading, whichever is greater, over the operating temperature range
Output	0-1 V
Operating Ranges	0-5%, 10%, 25% O <sub>2</sub>
Flowrate	2 scfh

**CO<sub>2</sub>/CO INFRARED ANALYZER – ANARAD MODEL AR-600**

Response Time (0-90%)	5 seconds
Zero Drift	±1%
Span Drift	±1%
Linearity	1%
Resolution	Less than 1% of full scale
Output	0-1 V
Operating Ranges	0-20% CO <sub>2</sub> /0-10,000 ppm CO
Flowrate	1000 cc/min

**CO GAS FILTER CORRELATION – THERMO ELECTRON MODEL 48**

Response Time (0-95%)	1 minute
Zero Drift	±0.2 ppm CO
Span Drift	Less than 1% full scale in 24 hours
Linearity	±1% full scale, all ranges
Accuracy	±0.1 ppm CO
Output	0-10 V
Operating Ranges	1, 2, 5, 10, 20, 50, 100, 200, 500, 1000 ppm
Flowrate	.5 - 2 lpm

**SO<sub>2</sub> UV ANALYZER – DUPONT MODEL 400**

Response Time (0-90%)	Less than 60 seconds
Zero Drift	Less than 2% full scale in 24 hours
Linearity	±1% full scale
Accuracy	±2% full scale
Output	0-5 V
Operating Ranges	0-100 ppm, 1-1000 ppm
Flowrate	500 - 1500 cc/min

**STRIP CHART RECORDERS (3) – LINSEIS 7025**

Pen Response	0.35 seconds Full Scale
Input Spans	1, 2, 5, 10, 20, 50, 100 MV
Zero Set	Stable across entire chart-width ±100%
Accuracy	.35% of Span
Dead Band	.15% of Span
Linearity	.25% of Span
Chart Speed	1, 2, 5, 10, 20, 50, 100 cm/min; 1, 2, 5, 10, 20, 50 cm/hr; fast advance 100 cm/min; LED indicator; forward and reverse selector
Recording Pen	Fiber tip pen
Chart Width	250 mm

**SCOTSMAN TRAILER**

Fully Insulated Air Conditioned -- 8 feet x 14 feet x 11 feet

1. Filter 0.6  $\mu$ , 99.9999 percent efficient
2. Duct
3. 316 stainless steel probe
4. 3/8-inch, heated (250°F) Teflon
5. Four-pass conditioner-dryer, 316 stainless steel internals
6. 3/8-inch, unheated Teflon
7. Teflon-lined sample pump
8. 3/8-inch unheated Teflon
9. Rotameter
10. 1/4-inch Teflon tubing
11. Calibration gas manifold
12. Calibration gas selector valve
13. Calibration gas cylinders
14. Backpressure regulator
15. Auxiliary analysis port

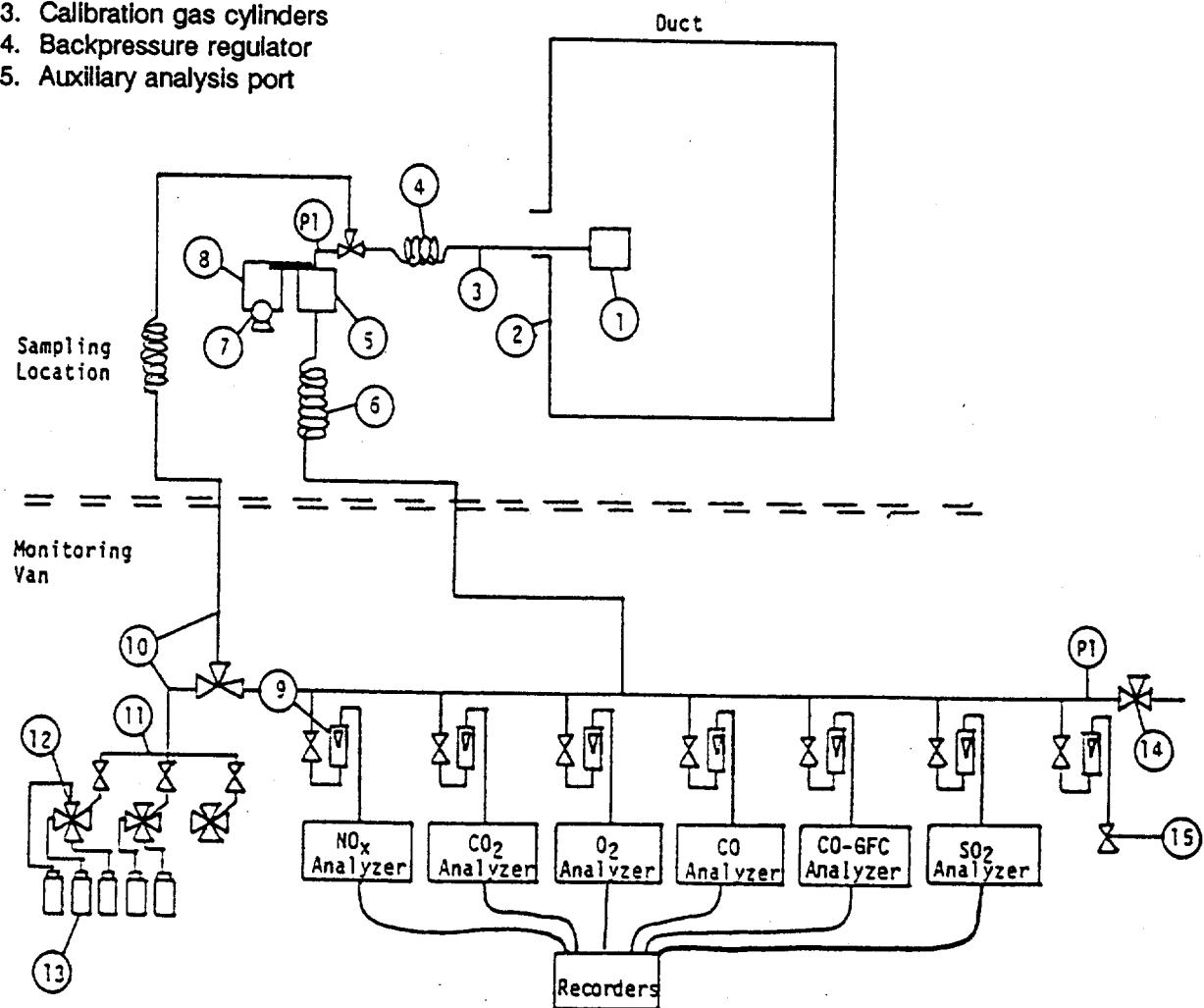


FIGURE 4-1. SCHEMATIC OF CONTINUOUS MONITORING SYSTEM

and regulators maintain constant flow through the system at a constant pressure.

Calibrations of the continuous analyzers were performed using EPA Protocol 1 calibration gases ( $\pm 1\%$ ) for NO<sub>x</sub> and NBS certified calibration gases ( $\pm 1\%$ ) for CO, CO<sub>2</sub> and O<sub>2</sub> and  $\pm 1\%$  and  $\pm 5\%$  NO/NO<sub>2</sub> for the converter efficiency check. Copies of the gas certifications are included in the Appendix of this report. All pertinent data (date, time, test locations, analyzer range, cal gas value) were recorded on both the field data sheets and continuous analyzer strip charts in the field.

At the start of a test day, a leak-check was performed. The sample probe was removed from the stack and the end was sealed. A leak-check was successful only if pressure at the analyzer system and flow through the rotameters to the individual analyzers all dropped to zero. A mandatory leak-check was performed at the completion of each test day.

An initial calibration was performed at the start of the test period by introducing zero and span gases for each analyzer and making the necessary adjustments. A multi-point linearity check was performed on each analyzer to insure all points were within  $\pm 2\%$  of full scale. An NO<sub>2</sub> to NO converter check was performed to insure converter efficiency was greater than 90%. And, finally, the upscale and downscale response time of the sampling system was measured to insure the sampling time per point could be set at 1-minute plus the system response time.

Calibration gas values were recorded on the continuous monitor strip charts and field data sheets. A calibration check was completed at the end of a test and adjustments (if necessary) to the analyzers were made in preparation for another test.

An external calibration of the sampling system was performed at the start of a test day. EPA Protocol 1 gas was flowed through the entire sampling system from the probe tip. The response of the analyzers had to be within  $\pm 5\%$  of the certified tank value before testing could proceed. An external calibration was also performed at the end of each test day.

Test data were collected by recording averages from the strip chart recordings onto the field data sheets. A fuel analysis was used to calculate the F-Factor, dscf/MMBtu corrected to zero percent O<sub>2</sub> (standard conditions 68°F, 29.92 inches Mercury), as described in 40 CFR 60.45. The pollutant concentration and the F-Factor were used to calculate an emission factor in lb/MMBtu.

#### 4.2 SAMPLING PROCEDURES FOR HYDROCARBONS

The sampling train for hydrocarbons consisted of a probe (3 feet of stainless steel), a Tygon sample line, a hand pump and a Tedlar bag. The entire train was purged with stack gas three times before collecting a sample. An integrated grab sample of the stack gases was collected over the test period. After sample collection, the Tedlar bag was lowered to the mobile lab for subsequent analysis. Triplicate grab samples were collected during the 40-minute test series, and one sample each were collected for the minimum and maximum AFR settings.

There was not a mobile lab on-site to analyze the hydrocarbons.

## SECTION 5

### ANALYSIS PROCEDURES

The hydrocarbon analysis was performed in the Steiner Environmental, Inc. climate-controlled laboratory located in Bakersfield, California. The fuel analysis was performed by Pacific Gas Technology in Bakersfield, California.

#### 5.1 FUEL

A sample of the fuel gas fired during this test program was collected and sent to Pacific Gas Technology (PGT) for analysis. Analysis was performed by PGT in accordance with EPA Title 40 Section 60.45. The specific procedures are itemized in Table 5-1. The results appear at the end of this section.

#### 5.2 ANALYSIS OF HYDROCARBON SAMPLES

The grab sample of hydrocarbons was analyzed using a Carle Model 211 AGC-FID. After purging the sample loop three times, a 1-ml sample was extracted from the Tedlar sample bag and injected onto a 6-foot long, 1/8-inch stainless steel column containing 80/100 mesh PoraPac Q, maintained at 150°C. The C<sub>1</sub> hydrocarbon was separated and the greater than C<sub>1</sub> hydrocarbons were backflushed to the detector for quantitation as a single peak. An HP Model 3390A reporting integrator was used to record and integrate the signal from the GC. A ±1% certified calibration gas (C<sub>1</sub>-C<sub>6</sub> HC in N<sub>2</sub>) was used to calibrate the GC before and after sample

analysis to quantitate the C<sub>1</sub> and greater than C<sub>1</sub> hydrocarbons. The beginning and end calibrations must agree within  $\pm 5\%$  for the data to be acceptable.

**TABLE 5-1. FUEL ANALYSIS METHODS**  
**LABORATORY TEST PROCEDURES FOR FUEL OILS AND FUEL GASES**  
**Reference: EPA Title 40, Section 60.45**

**FUEL OIL TESTS:**

Sediment and Water, Vol. %	ASTM D4007-81
Gravity by Hydrometer (API)	ASTM D1298-80
API Gravity Corrected to 60°F	ASTM Table 5A
Gross Calorific Value (Btu/lb)	ASTM D2015-77
Ultimate Analysis (C, H, O, N, S, wt. %)	
Carbon, Hydrogen	ASTM D3178-73
Nitrogen (chemiluminescence detector)	ASTM D3431-80
Sulfur	ASTM D2622-82
Ash	ASTM D482
Oxygen	ASTM D3176-74

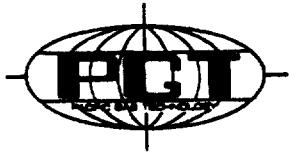
**GASEOUS FUELS BY GAS-LIQUID CHROMATOGRAPHY:**

Gas Analysis	ASTM D1945-81
Sulfur Analysis	CPA B16
Calculation of Gross Calorific Value	ASTM D3588-81
Component Weight %, F-factor calculations	EPA 40:60.45

**PROCEDURES FOR SCRUBBER LIQUOR ANALYSIS:**

Specific Gravity	ASTM D1429
Chlorides	ASTM D512-67

# PACIFIC GAS TECHNOLOGY

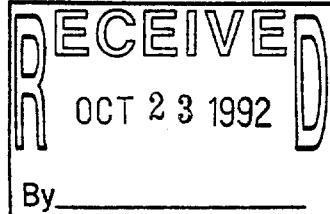


2122 Q Street  
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 805/324-1317  
 Fax: 805/324-2746

## GAS ANALYSIS BY CHROMATOGRAPH

STEINER ENVIRONMENTAL, INC  
 4930 Boylan Street  
 Bakersfield, CA 93308

Attention: Jim Steiner



Sample ID : SO CAL GAS\GOLETA  
 UNIT #7 OUTLET  
 PUC FUEL GAS

SAMPLED: OCTOBER 12, 1992  
 SUBMITTED: OCTOBER 13, 1992  
 REPORTED: OCTOBER 19, 1992

LAB # 4741-1

STEINER ID # 28959

### ANALYZED GAS

	MOLE %	WT %	CHONS	WT %
OXYGEN	0.02	0.03	CARBON	75.68
NITROGEN	0.40	0.58	HYDROGEN	23.07
CARBON DIOXIDE	0.38	0.87	OXYGEN	0.67
HYDROGEN	ND	0.00	NITROGEN	0.58
CARBON MONOXIDE	ND	0.00	SULFUR	0.00
HYDROGEN SULFIDE	ND	0.00		
METHANE	85.83	71.68		
ETHANE	6.94	10.86		
PROPANE	5.04	11.57		
iso-BUTANE	0.41	1.24		
n-BUTANE	0.75	2.27		
iso-PENTANE	0.12	0.45		
n-PENTANE	0.08	0.30		
HEXANE +	0.03	0.13		
TOTAL:	100.00			

SPECIFIC GRAVITY *	:	0.663	SPECIFIC	
HYDROGEN SULFIDE	:	ppm (GC/FPD)	VOLUME :	19.77 cu ft/lb
STEINER ID#	:			
TOTAL * DRY	:	1164	NET * DRY	:
BTU/cu ft			BTU/cu ft	1053
WET	:	1144	WET	: 1034
BTU/lb	:	23017	BTU/lb	: 20816

\* CALCULATED ACCORDING TO : ASTM D-3588

## SECTION 6

### QUALITY ASSURANCE

This section of the report describes the QA/QC procedures employed on the test program.

#### 6.1 CONTINUOUS MONITORS QUALITY ASSURANCE

The NO<sub>x</sub> analyzer were calibrated before and after each test using an EPA Protocol 1 gas ( $\pm 1\%$ ) traceable to NBS. The CO, CO<sub>2</sub>, and O<sub>2</sub> analyzers are calibrated before and after each test using a NBS certified gas mixture ( $\pm 1\%$ ). Copies of the calibration gas certificates appear in Appendices A and B of this report.

A sampling system check was performed at the beginning and end of each test day. This was done by introducing an EPA Protocol 1 gas at the sampling probe and measuring the system response. The purpose of this was to check the system for leaks and sample loss.

Multi-point calibration linearity checks of the continuous analyzers were performed on January 28, 1992 through January 30, 1992. These results were well within CARB limitations of  $\pm 2\%$  of full scale. Tables 6-1 through 6-5 list the results of these checks.

All of the EPA Method 20 QA/QC checks (e.g., linearity, interference, response time, converter efficiency, etc.) were performed on the continuous monitoring system and the system passed these requirements.

## **6.2 QUALITY ASSURANCE OF HYDROCARBON ANALYSES**

Each sample container is purged in the field with sample prior to the actual tests. A certified gas is used to calibrate the gas chromatograph used to measure the hydrocarbons. The calibration certificate for the gas used appears in Appendix B. Duplicate analysis of Test #1 was conducted and the result was 103.5%.

TABLE 6-1. NO<sub>x</sub> CALIBRATION SUMMARY

Monitoring Trailer: 1	Calibrated by: JP 1/30/92
Analyzer: TECO	Calibrator Manufacturer: Environics
Model: 10 AR	Model: 201-1520
Serial Number: 15311-154	Serial Number: 1122
NO <sub>x</sub> Standard: CC7204, CC72048	
Concentration: 9760 ppm, 1039 ppm	
Cylinder Pressure: 1900 psi, 1900 psi	

NO<sub>x</sub> CALIBRATION AND LINEARITY CHECKS

Range 0-10,000 ppm

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	NO <sub>x</sub> out ppm	Chart ppm	% Difference Full Scale
Zero	980	--	0	0	0
80% URL	182	810	7968	7968	0
1	381	597	5962	6010	+ .48
2	579	399	3984	4105	+ 1.21
3	780	202	2005	2100	+ .95

Range 0-1000 ppm

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	NO <sub>x</sub> out ppm	Chart ppm	% Difference Full Scale
Zero	8852	--	0	0	0
80% URL	8128	716	791	791	0
1	8306	538	594	600	+ .6
2	8488	360	397	407	+ 1.0
3	8669	182	201	203	+ .2

TABLE 6-1. NO<sub>x</sub> CALIBRATION AND LINEARITY CHECKS (Concluded)

TECO Model 10-AR/Trailer #1/January 30, 1992

Range 0-100 ppm

Calibration Points	Flow, Dil. cc/min.	Flow, Std. cc/min.	NO <sub>x</sub> out ppm	Chart ppm	% Difference +2% Full Scale
Zero	8360	-	0	0	0
80% URL	7716	636	79.2	79.2	0
1	7878	478	59.5	60.0	+ .5
2	8037	320	39.8	40.2	+ .4
3	8196	162	20.1	20.5	+ .4

Range 0-25 ppm

Calibration Points	Flow, Dil. cc/min.	Flow, Std. cc/min.	NO <sub>x</sub> out ppm	Chart ppm	% Difference +2% Full Scale
Zero	2169	-	0	0	0
80% URL	2130	42.0	19.86	19.86	0
1	2140	31.4	15.00	15.40	+ 1.6
2	2150	21.1	10.10	10.30	+ .8
3	2159	11.0	5.25	5.27	+ .08

Range 0-10 ppm

Calibration Points	Flow, Dil. cc/min.	Flow, Std. cc/min.	NO <sub>x</sub> out ppm	Chart ppm	% Difference +2% Full Scale
Zero	9637	0.0	0	0	0
80% URL	9563	73.0	7.90	7.90	0
1	9580	55.0	5.95	5.92	.3
2	9595	37.0	3.98	3.94	.4
3	9615	19.0	2.03	2.02	.1

TABLE 6-2. CO CALIBRATION SUMMARY

Monitoring Trailer: 1	Calibrated by: JP 1/30/92
Analyzer: ANARAD	Calibrator Manufacturer: Environics
Model: AR 602	Model: 201-1520
Serial Number: 1482	Serial Number: 1122
CO Standard: ALM17548	
Concentration: 42490 ppm	
Cylinder Pressure: 1800 psi	

CO CALIBRATION AND LINEARITY CHECKS

Range 0-10,000 ppm

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	CO out ppm	Chart ppm	% Difference +2% Full Scale
Zero	4921	0	0	0	0
80% URL	3999	930.8	8022	8022	0
1	4230	687.6	5942	5950	+ .08
2	4460	460.0	3974	4009	+ .35
3	4690	232.0	2003	2180	+ 1.77

TABLE 6-3. CO CALIBRATION SUMMARY

Monitoring Trailer: 1		Calibrated by: JP 1/30/92
Analyzer:	TECO	Calibrator Manufacturer: Environics
Model:	48	Model: 201-1520
Serial Number:	21130-195	Serial Number: 1122
CO Standard:	CC81181	
Concentration:	10430 ppm	
Cylinder Pressure:	1700 psi	

CO CALIBRATION AND LINEARITY CHECKS

Range 0-20 ppm

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	CO out ppm	Chart ppm	% Difference +2% Full Scale
Zero	9500	0	0	0	0
80% URL	9335	16.5	18.4	18.4	0
1	9686	11.6	12.5	12.7	+ 1.0
2	9688	8.0	8.6	8.8	+ 1.0
3	9691	4.3	4.7	5.0	+ 1.5

Range 0-100 ppm

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	CO out ppm	Chart ppm	% Difference +2% Full Scale
Zero	9600	0	0	0	0
80% URL	9568	74.3	80.4	80.4	0
1	9585	55.0	59.5	59.5	0
2	9605	37.0	39.9	39.4	- .5
3	9627	19.0	20.3	19.9	- .4

TABLE 6-3. CO CALIBRATION AND LINEARITY CHECKS (Concluded)

TECO Model 48/Trailer #1/January 30, 1992

Range 0-500 ppm

Calibration Points	Flow, Dil. cc/min.	Flow, Std. cc/min.	CO out ppm	Chart ppm	% Difference +2% Full Scale
Zero	9500	0	0	0	0
80% URL	8985	356.0	397.4	397.4	0
1	9078	267.5	298.5	300.0	.3
2	9166	180.0	200.5	195.0	- 1.1
3	9453	91.7	100.3	95.5	- .96

Range 0-1000 ppm

Calibration Points	Flow, Dil. cc/min.	Flow, Std. cc/min.	CO out ppm	Chart ppm	% Difference +2% Full Scale
Zero	9000	0	0	0	0
80% URL	8181	671.0	790.6	790.6	0
1	8346	504.0	594.0	594.0	0
2	8515	337.0	397.0	398.0	.1
3	8684	170.3	200.8	196.2	- .46

TABLE 6-4. CO<sub>2</sub> CALIBRATION SUMMARY

Monitoring Trailer: 1	Calibrated by: JP 1/30/92
Analyzer: ANARAD	Calibrator Manufacturer: Environics
Model: AR 602	Model: 201-1520
Serial Number: 1482	Serial Number: 1122
CO <sub>2</sub> Standard: CC86353	
Concentration: 41.2%	
Cylinder Pressure: 1000 psi	

CO<sub>2</sub> CALIBRATION AND LINEARITY CHECKS

Range 0-20 %

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	CO <sub>2</sub> out %	Chart %	% Difference +2% Full Scale
Zero	2172	0	0	0	0
80% URL	1339	973.8	17.40	17.40	0
1	1549	718.0	13.05	13.00	.25
2	1762	471.6	8.70	8.56	.70
3	1968	237.1	4.40	4.29	.55

TABLE 6-5. O<sub>2</sub> CALIBRATION SUMMARY

Monitoring Trailer: 1		Calibrated by: JP 1/28/92	
Analyzer:	Teledyne	Calibrator Manufacturer:	Environics
Model:	326A	Model:	201-1520
Serial Number:	36423	Serial Number:	1122
O <sub>2</sub> Standard:	A14722		
Concentration:	45%		
Cylinder Pressure:	1700 psi		

O<sub>2</sub> CALIBRATION AND LINEARITY CHECKS

Range 0-5 %

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	O <sub>2</sub> out %	Chart %	% Difference +2% Full Scale
Zero	3945	0	0	0	0
80% URL	3597	356.7	4.07	4.07	0
1	7348	532.6	3.04	3.11	+ 1.4
2	7525	356.2	2.04	2.09	+ 1.0
3	7699	180.2	1.03	1.09	+ 1.2

Range 0-10 %

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	O <sub>2</sub> out %	Chart %	% Difference +2% Full Scale
Zero	4925	--	0	0	0
80% URL	4056	900.0	8.17	8.17	0
1	4271	664.0	6.06	6.18	+ 1.20
2	4487	444.0	4.05	4.24	+ 1.90
3	4705	223.7	2.04	2.21	+ .80

TABLE 6-5. O<sub>2</sub> CALIBRATION AND LINEARITY CHECKS (Concluded)

Teledyne Model 326A/Trailer #1/January 28, 1992

Range 0-25 %

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	O <sub>2</sub> out %	Chart %	% Difference +2%
					Full Scale
Zero	1973	0	0	0	0
80% URL	1101	899.2	20.30	20.30	0
1	1317	663.8	15.09	15.16	+ .28
2	1535	443.9	10.10	10.15	+ .20
3	1753	223.7	5.09	5.14	+ .20

**APPENDIX A**  
**STEINER ENVIRONMENTAL INLET DATA**

## CONTINUOUS MONITOR DATA SHEET

### Plant Soils Gels Galleta

Date 10-12-92 Run No. JANT CAC 1

Test Location UNIT #7 INLET

### Operator Sm

~~type~~ Sex 66 trailer No. 1

Dry Uncorrected

Dry Uncorrected

CONTINUOUS MONITOR DATA SHEET

Plant So Cal Gas Colton

Date 10-17-97 Run No. 2,3  
 Test Location Unit #1 Inlet  
 Operator SM  
 Fuel Type Nat Gas Trailer No. 1

APCD Witness/Number  
 Client Rep Tim Erdley  
 Generator Type N/A  
 Burner Type N/A  
 $O_2$  Controller Type Catalytic Converter

Dry Uncorrected

Time	Sample Point	$O_2$ %	$CO_2$ %	CO ppm	$SO_2$ ppm	NO ppm	$NO_x$ ppm	Comments	Miscellaneous Information
1345	0.975	9.15	8170			4070	5100	Same Values	CALIBRATION GASES Same as Pg 1
1355	0.0	0.0	0.0			0.0	0.0		$NO_x$
1405	.11	10.85	5320			2190	2190	Run #2 Unit #1	$SO_2$
1415	.11	10.90	5100			2200	2200		$CO$
1425	.11	10.85	5250			2200	2200		$CO/CO_2/0_2$
1435	.11	10.90	4920			2210	2210		
1445	0.0	0.0	0.0			0.0	0.0		Wet Bulb: <u>N/A</u> Dry Bulb: <u>N/A</u>
1455	0.980	9.15	8280			4080	4080	Span	Barometric Press: <u>N/A</u>
1505	.10	10.90	4900			2080	2080	Run #3 UNIT #1	RESPONSE TIME
1515	.10	10.95	4850			2090	2090		Upscale: <u>N/A</u> Downscale: <u>N/A</u>
	.09	10.85	5000			2080	2080		Upscale: <u>N/A</u> Downscale: <u>N/A</u>
	.09	10.90	4950			2050	2050		Upscale: <u>N/A</u> Downscale: <u>N/A</u>
	0.0	0.0	0.0			0.0	0.0		PROCESS DATA See Data & Data
	0.960	9.15	8170			4000	4000	Span	Fuel Flow: <u>N/A</u> Steam Flow: <u>N/A</u> Rating: <u>N/A</u>
									CONVERTER GAS Cal Gas Values   Actual Values NO NO <u>N/A</u> NO <u>N/A</u>
									Conv. Efficiency: <u>N/A</u>

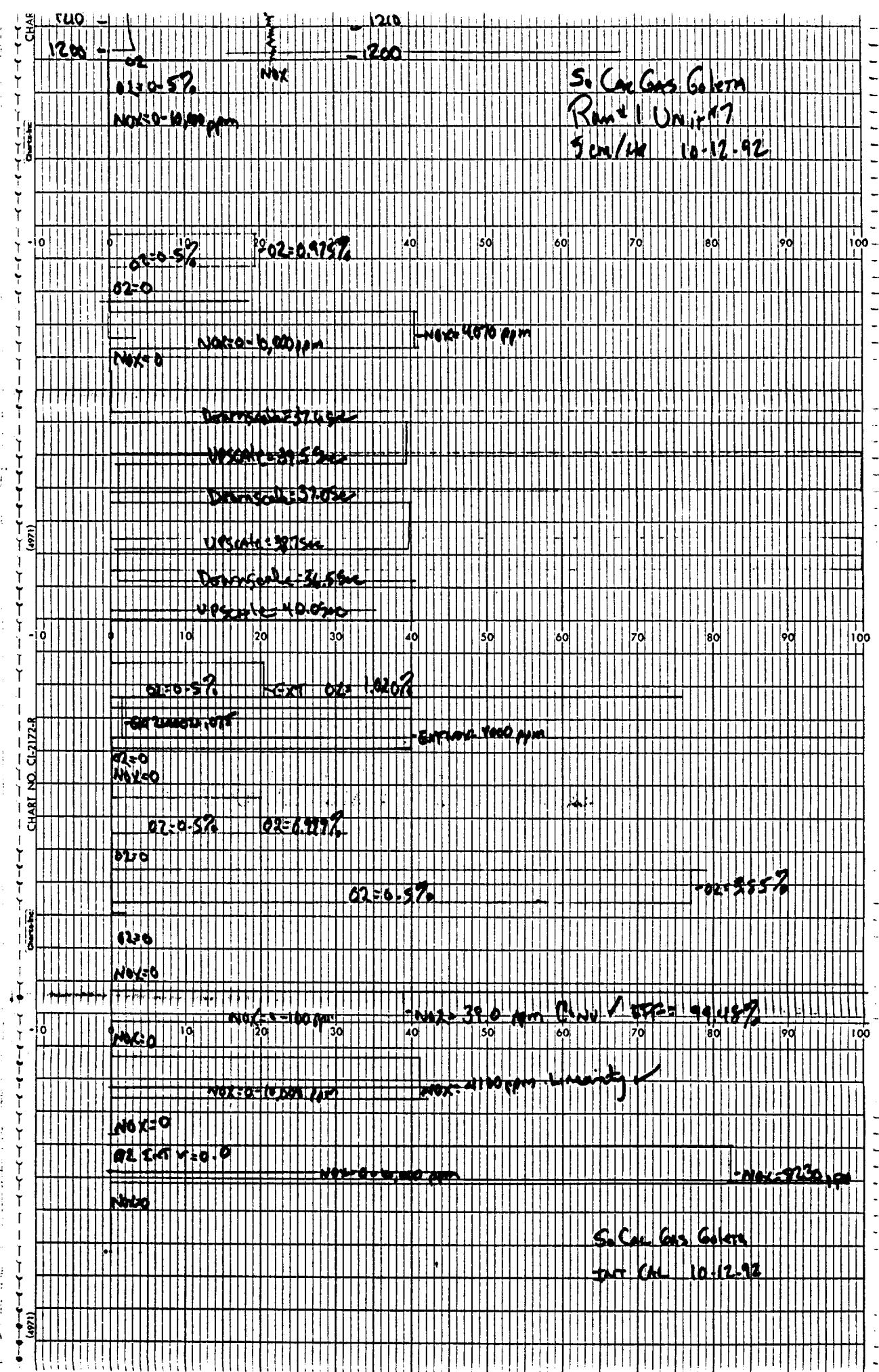
**CONTINUOUS MONITOR DATA SHEET**

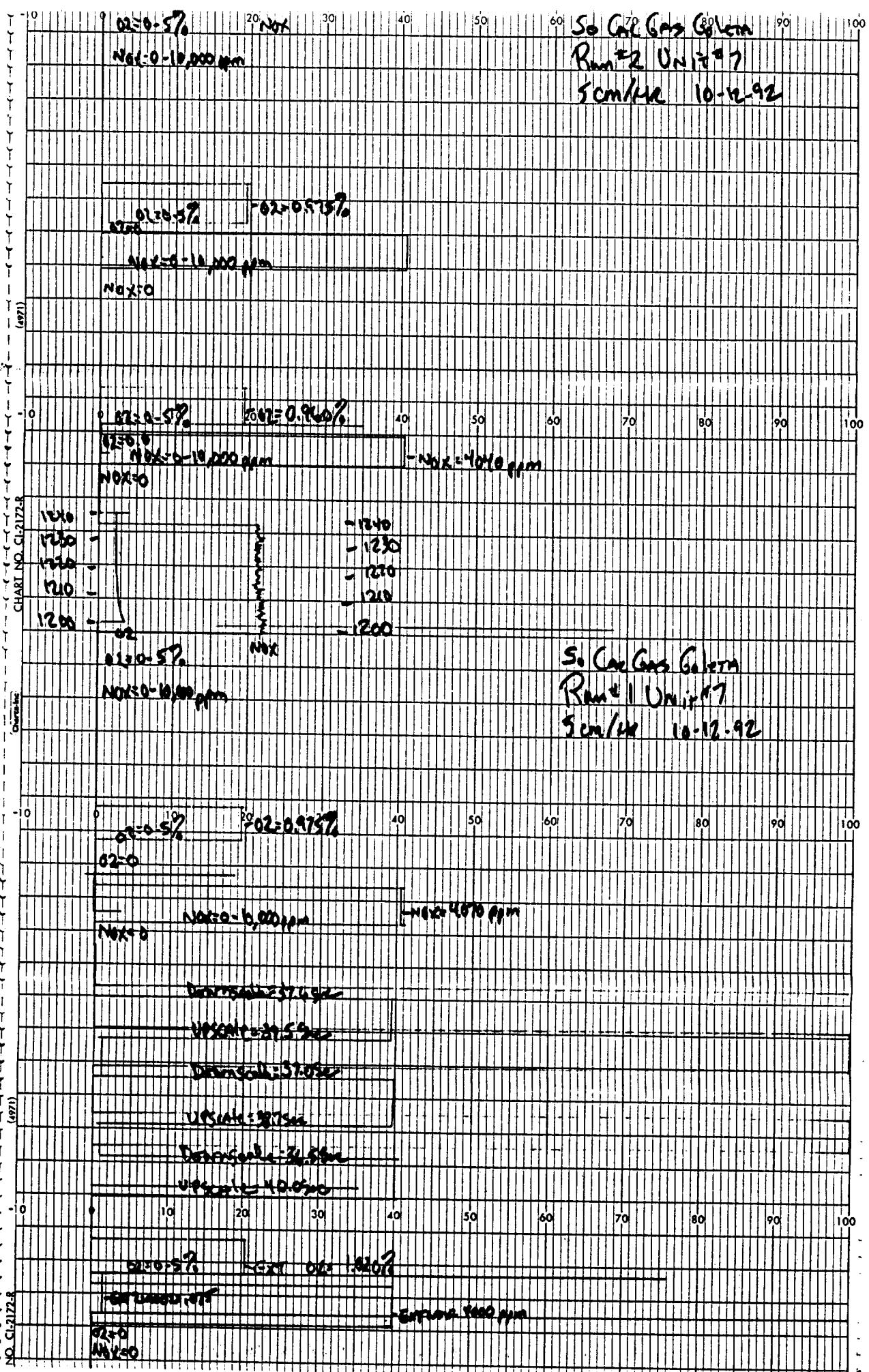
Plant S. Cas Gas Goleita  
 Date 10-12-92 Run No. Hi Low ABB Set Pt's  
 Test Location Unit #7 Inlet  
 Operator SM  
 Fuel Type Nat Gas Trailer No. 1

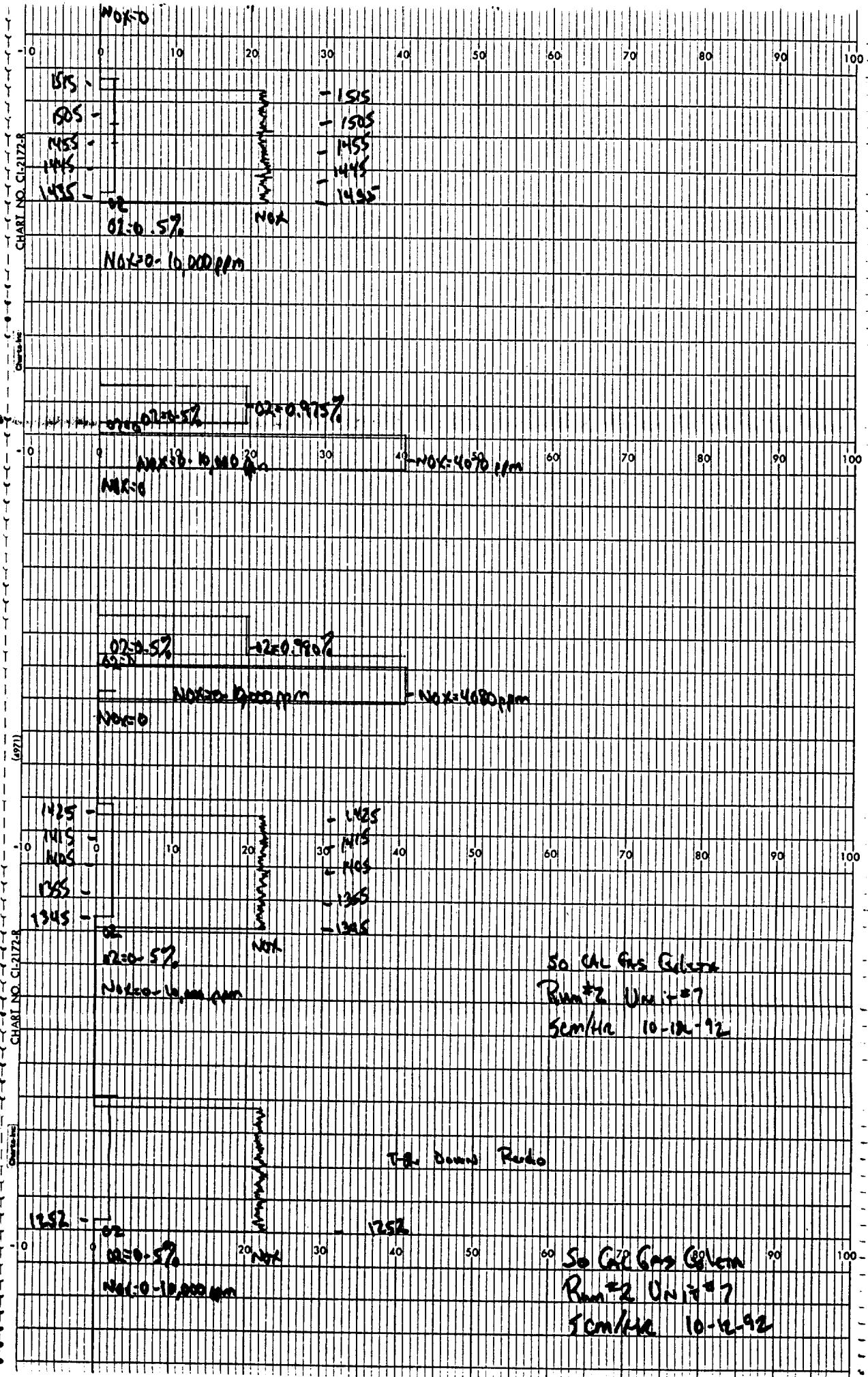
APCD Witness/Number \_\_\_\_\_  
 Client Rep Tim Erdkay  
 Generator Type N/A  
 Burner Type N/A  
 O<sub>2</sub> Controller Type Catalytic Converter

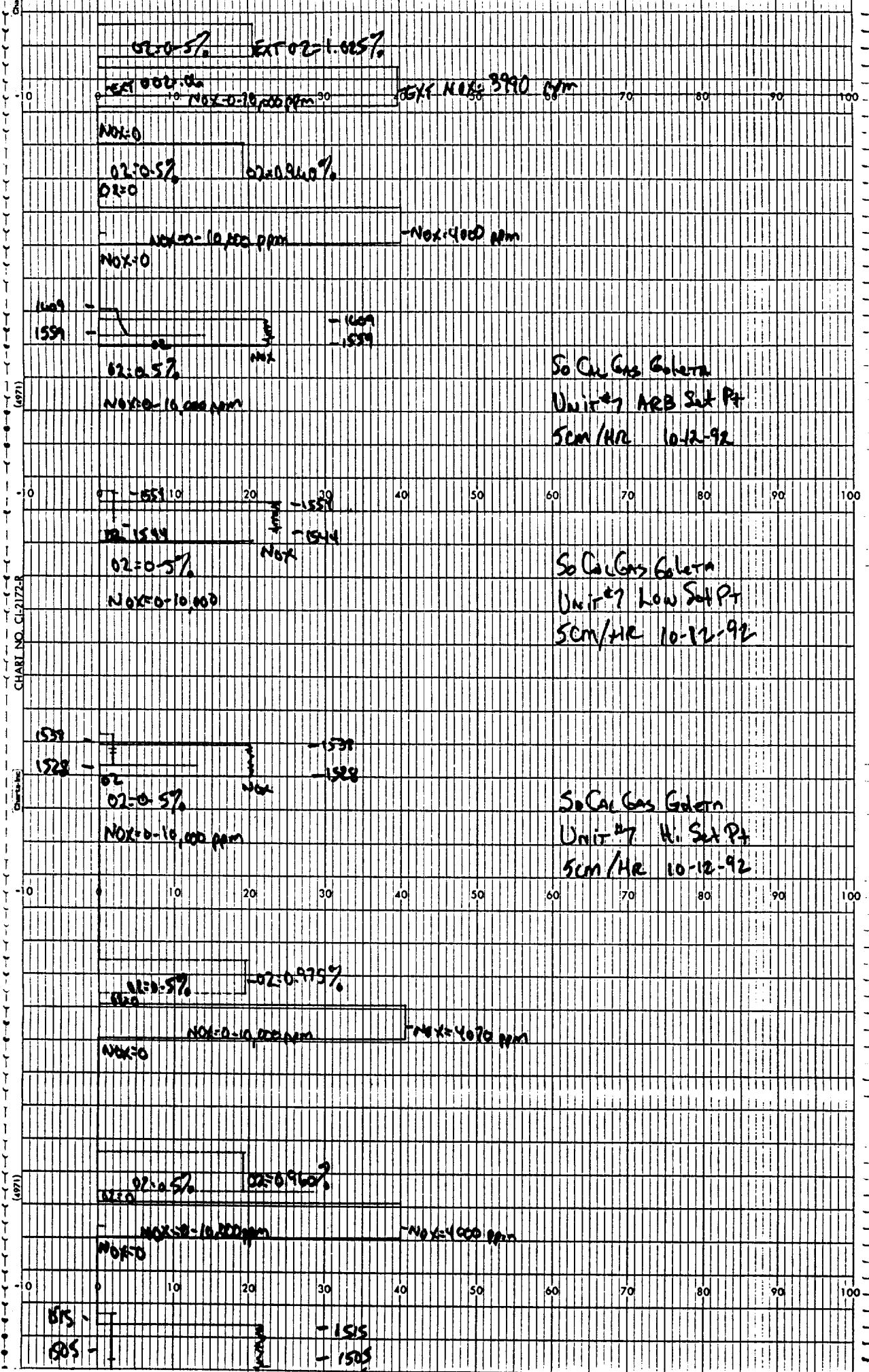
**Dry Uncorrected**

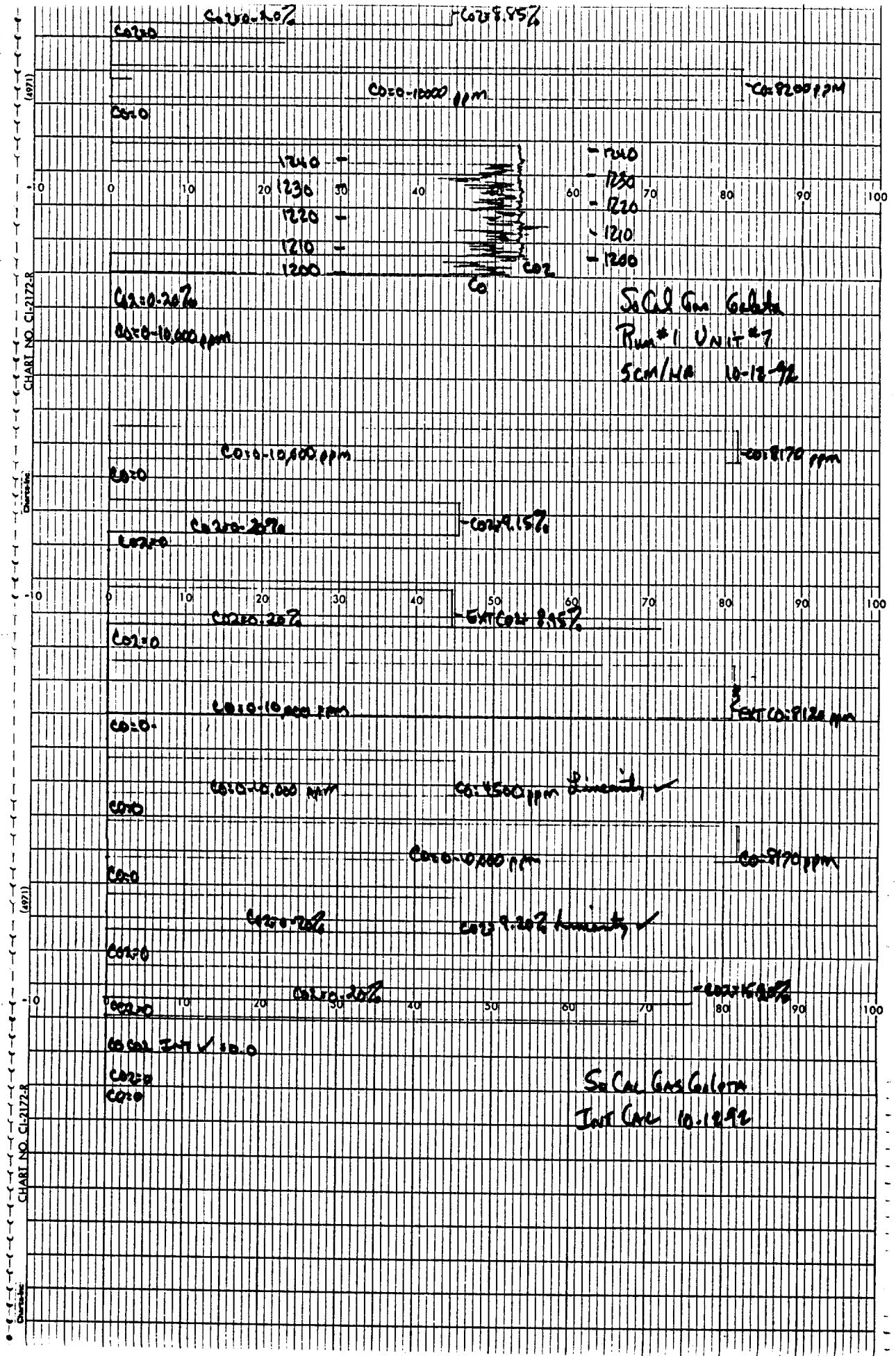
Time	Sample Point	O <sub>2</sub> %	CO <sub>2</sub> %	CO ppm	SO <sub>2</sub> ppm	NO ppm	NO <sub>x</sub> ppm	Comments	Miscellaneous Information
1528	1.09	10.63	6300	0.0	0.0	0.0	0.0	40'20 Dian Gas Value 2000 2000	CALIBRATION GASES Same as gas NO <sub>x</sub> SO <sub>2</sub> CO CO/CO <sub>2</sub> /O <sub>2</sub>
1524	.09	11.20	3450	2340	UNIT #7 ARB SET PT	H. 3343	L. 801	Wet Bulb: <u>N/A</u> Barometric Press: <u>N/A</u>	Dry Bulb: <u>N/A</u>
1559	1.13	11.05	4300	2240	UNIT #7 ARB SET PT	H. 3446	L. 841	RESPONSE TIME Upscale: <u>N/A</u> Downscale: <u>N/A</u> Upscale: <u>N/A</u> Downscale: <u>N/A</u> Upscale: <u>N/A</u> Downscale: <u>N/A</u>	Fuel Flow: Steam Flow: Rating:
									PROCESS DATA <u>See. O.A.O. &amp; D.L.</u>
									CONVERTER GAS Cal Gas Values   Actual Values NO   N/A NO <sub>2</sub>   N/A
									Conv. Efficiency: <u>N/A</u>

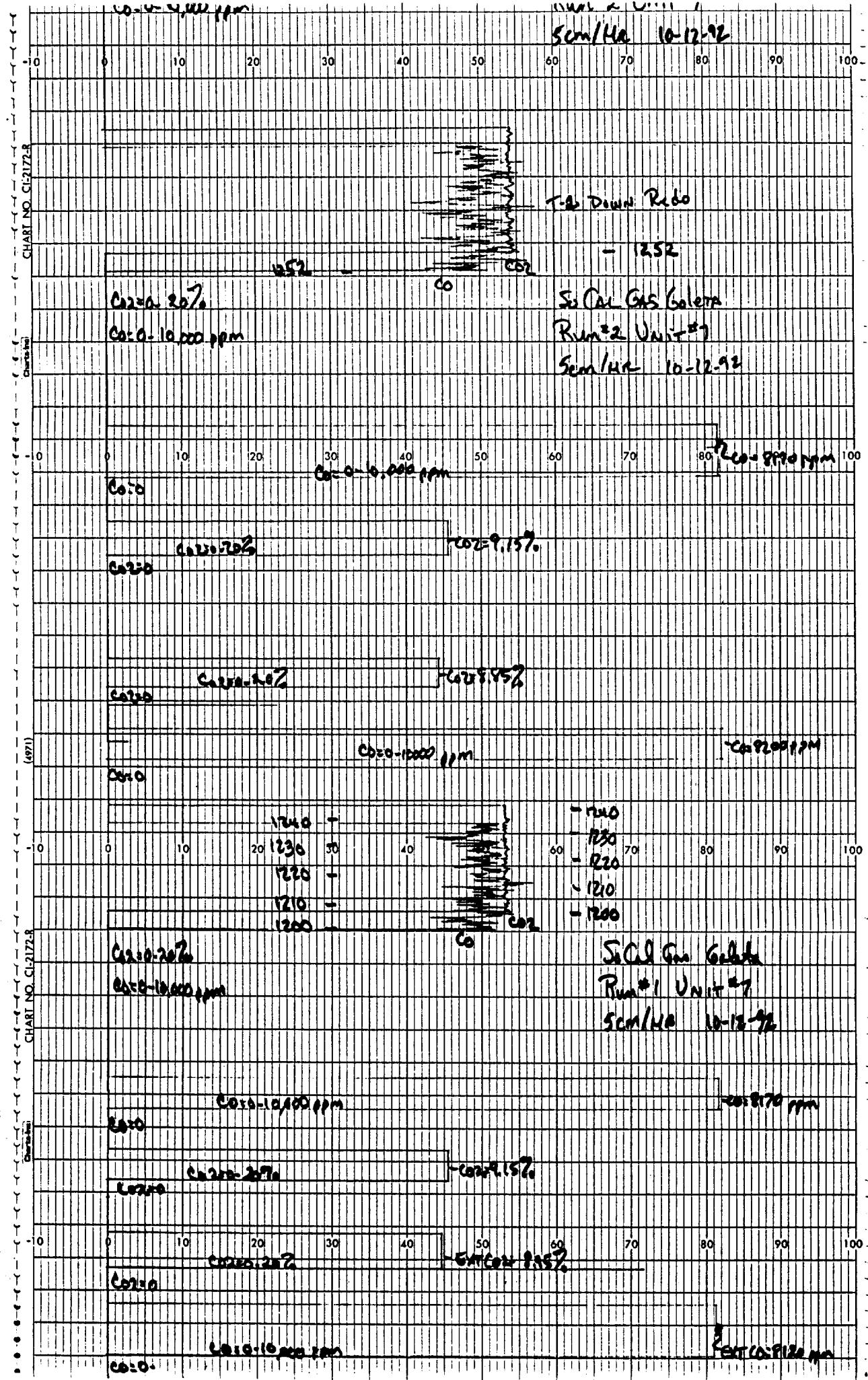


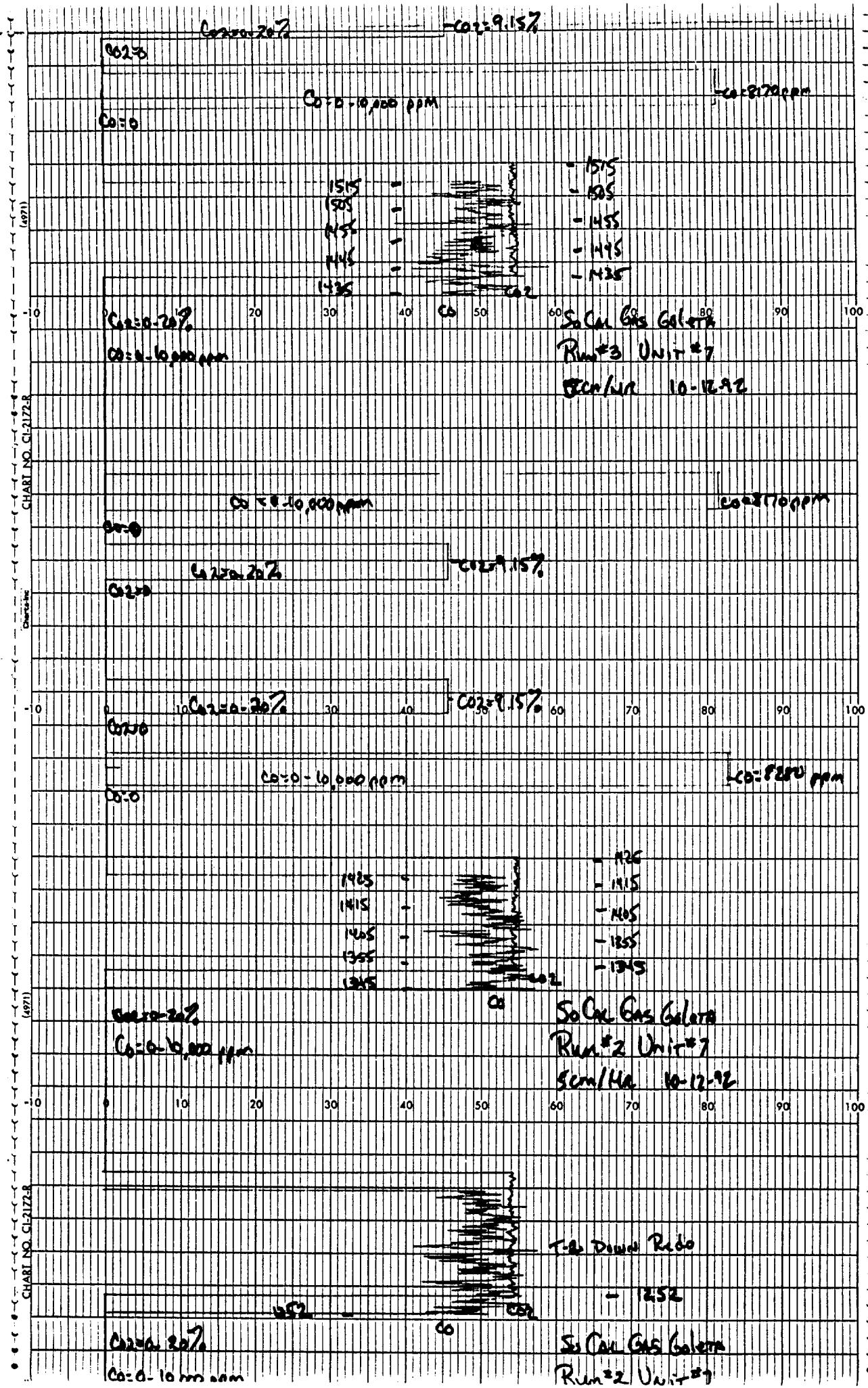












$\text{CO} = 0 - 10,000 \text{ ppm}$  $\text{CO} = \text{Ext} = 8000 \text{ ppm}$  $\text{CO} = 0$  $\text{CO}_2 = 0 - 20\%$  $-\text{Ext CO}_2 = 9.00\%$  $\text{CO}_2 = 0$  $\text{CO}_2 = 0 - 20\%$  $\text{CO}_2 = 9.5\%$  $\text{CO}_2 = 0$  $\text{CO} = 0 - 10,000 \text{ ppm}$  $\text{CO} = 8100 \text{ ppm}$

A. CALIBRATION AND CORRECTION DATA

Company : SO CAL GAS GOLETA

Date : 10/12/92

Station : UNIT #7 INLET

Test Run : 1

Test Condition:

Concentration : Drift Uncorrected (A) / Corrected (B)

Point #	%O2		%CO2		ppm CO		ppm SO2		ppm NOX	
	A	B	A	B	A	B	A	B	A	B
1	0.14	0.14	10.65	10.69	4900.00	4897.75	2190.00	2192.02		
2	0.13	0.13	10.64	10.77	5005.00	4998.12	2115.00	2120.86		
3	0.12	0.12	10.60	10.82	5000.00	4988.55	2115.00	2124.79		
4	0.12	0.12	10.62	10.93	4950.00	4934.15	2120.00	2133.76		
MEAN		0.13			10.81		4954.64		2142.86	

	%O2	%CO2	ppm CO	ppm SO2	ppm NOX
Zero Check	0.00	0.00	0.00	0.00	0.00
Span Check	0.96	8.85	8200.00		4040.00
Cal. Gas	0.98	9.15	8170.00		4070.00
Scf	-0.00385	-0.00820	0.00092		-0.00184
Zcf	0.00000	0.00000	0.00000		0.00000

Scf, Span Drift Correction Factor = (% Drift / 100) / # of Readings

Zcf, Zero Drift Correction Factor = Zero Drift / # of Readings

Cz, Zero Corr. Concentration = measured value - [Zcf x (Point # - 0.5)]

B, Corrected Concentration = Cz / [1 + (Scf x (Point # - 0.5))]

## A. CALIBRATION AND CORRECTION DATA

Company : SO CAL GAS GOLETA

Date : 10/12/92

Station : UNIT #7 INLET

Test Run : 2

Test Condition:

Concentration : Drift Uncorrected (A) / Corrected (B)									
	%O2		%CO2		ppm CO		ppm SO2		ppm NOx
Point #	A	B	A	B	A	B	A	B	A
1	0.11	0.11	10.85		5300.00	5291.10	2190.00	2189.33	
2	0.11	0.11	10.90		5100.00	5074.38	2200.00	2197.97	
3	0.11	0.11	10.85		5250.00	5206.19	2200.00	2196.63	
4	0.11	0.11	10.90		4920.00	4862.71	2210.00	2205.26	
MEAN	0.11		10.88				5108.59		2197.30

	%O2	%CO2	ppm CO	ppm SO2	ppm NOx
Zero Check	0.00	0.00	0.00	0.00	0.00
Span Check	0.98	9.15	8280.00		4080.00
Cal. Gas	0.98	9.15	8170.00		4070.00
Scf	0.00128			0.00337	0.00061
Zcf	0.00000			0.00000	0.00000

Scf, Span Drift Correction Factor = (% Drift / 100) / # of Readings

Zcf, Zero Drift Correction Factor = Zero Drift / # of Readings

Cz, Zero Corr. Concentration = measured value - [Zcf x (Point # - 0.5)]

B, Corrected Concentration = Cz / [1 + (Scf x (Point # - 0.5))]

## A. CALIBRATION AND CORRECTION DATA

Company : SO CAL GAS GOLETA  
 Station : UNIT #7 INLET

Date : 10/12/92  
 Test Run : 3  
 Test Condition:

Concentration : Drift Uncorrected (A) / Corrected (B)

Point	%CO2		ppm CO		ppm SO2		ppm NOX	
	A	B	A	B	A	B	A	B
#	0.10	0.10	10.90	✓	4900.00		2080.00	2084.48
1	0.10	0.10	10.95		4850.00		2090.00	2103.57
2	0.09	0.09	10.85		5000.00		2040.00	2062.17
3	0.09	0.09	10.90		4950.00		2050.00	2081.32
MEAN	0.10	0.10			4925.00		2082.88	

	%CO2	%CO2	ppm CO	ppm SO2	ppm NOX
Zero Check	0.00	0.00	0.00	0.00	0.00
Span Check	0.96	9.15	8170.00	4000.00	
Cal. Gas	0.98	9.15	8170.00	4070.00	
Scf	-0.00385				-0.00430
Zcf	0.00000				0.00000

Scf, Span Drift Correction Factor = (% Drift / 100) / # of Readings  
 Zcf, Zero Drift Correction Factor = Zero Drift / # of Readings  
 Cz, Zero Corr. Concentration = measured value - [Zcf x (Point # - 0.5)]  
 B, Corrected Concentration = Cz / [1 + (Scf x (Point # - 0.5))]

## A. CALIBRATION AND CORRECTION DATA

Company : SO CAL GAS GOLETA

Station : UNIT #7 INLET HI-LO

Date : 10/12/92  
Test Run : 1  
Test Condition:

Concentration : Drift Uncorrected (A) / Corrected (B)

Point #	%O2		%CO2		ppm CO		ppm SO2		ppm NOx	
	A	B	A	B	A	B	A	B	A	B
1	0.09	0.09	10.63	11.20	6300.00	6309.01	2000.00	2005.75		
2	0.09	0.09	11.20	11.05	3450.00	3464.84	2340.00	2360.30		
3	0.13	0.13	11.05	11.05	4300.00	4330.92	2240.00	2272.57		
MEAN			0.10	10.96			4701.59		2212.87	

	%O2	%CO2	ppm CO	ppm SO2	ppm NOx
Zero Check	0.00	0.00	0.00	0.00	0.00
Span Check	0.96	9.15	8100.00		4000.00
Cal. Gas	0.98	9.15	8170.00		4070.00
Scf	-0.00513		-0.00286		-0.00573
Zcf	0.00000		0.00000		0.00000

Scf, Span Drift Correction Factor = (% Drift / 100) / # of Readings  
 Zcf, Zero Drift Correction Factor = Zero Drift / # of Readings  
 Cz, Zero Corr. Concentration = measured value - [Zcf x (Point # - 0.5)]  
 B, Corrected Concentration = Cz / [1 + (scf x (Point # - 0.5))]

B. ZERO AND SPAN DRIFT PERCENT CALCULATIONS

Company : SO CAL GAS GOLETA Date : 10/12/92

Station : UNIT #7 INLET

Run 1	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span	0.98	9.15	8170.00		4070.00
Measured Span	0.96	8.85	8200.00		4040.00
Zero Drift	0.00	0.00	0.00		0.00
Final, Actual Span	0.96	8.85	8200.00		4040.00
Percent Drift	-1.5	-3.3	0.4		-0.7
*****	*****	*****	*****	*****	*****
Run 2	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span	0.98	9.15	8170.00		4070.00
Measured Span	0.98	9.15	8280.00		4080.00
Zero Drift	0.00	0.00	0.00		0.00
Final, Actual Span	0.98	9.15	8280.00		4080.00
Percent Drift	0.5	0.0	1.3		0.2
*****	*****	*****	*****	*****	*****
Run 3	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span	0.98	9.15	8170.00		4070.00
Measured Span	0.96	9.15	8170.00		4000.00
Zero Drift	0.00	0.00	0.00		0.00
Final, Actual Span	0.96	9.15	8170.00		4000.00
Percent Drift	-1.5	0.0	0.0		-1.7

Final, Actual Span = Measured Span - Zero Drift

Percent Drift = (Final, Actual Span - Initial Span) / Initial Span x 100

B. ZERO AND SPAN DRIFT PERCENT CALCULATIONS

Company : SO CAL GAS GOLETA Date : 10/12/92

Station : UNIT #7 INLET HI-LO

Run	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span	0.98	9.15	8170.00		4070.00
Measured Span	0.96	9.15	8100.00		4000.00
Zero Drift	0.00	0.00	0.00		0.00
Final, Actual Span	0.96	9.15	8100.00		4000.00
Percent Drift	-1.5	0.0	-0.9		-1.7
*****					
Run	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span					
Measured Span					
Zero Drift					
Final, Actual Span					
Percent Drift					
*****					
Run	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span					
Measured Span					
Zero Drift					
Final, Actual Span					
Percent Drift					

Final, Actual Span = Measured Span - Zero Drift

Percent Drift = (Final, Actual Span - Initial Span) / Initial Span x 100

# FUEL / FLOWRATE CALCULATIONS

---

PLANT ..... SO CAL GAS GOLETA  
 SOURCE ..... UNIT #7 INLET Temp. Std.: 60  
 DATE ..... OCT 12, 1992 Press. Std: 29.92

---

## FUEL FLOWRATE DATA :

---

	RUN 1	RUN 2	RUN 3
Barometric Press., in.Hg..	29.92	29.92	29.92
Brake Horsepower .....	654.00	648.00	643.00
Fuel Flow, scfh .....			
Oxygen, % .....	0.13	0.11	0.10
Fuel Flow, acfh .....	5538.00	5538.00	5538.00
Fuel Press, psig .....	1.00	1.00	1.00
" " psia .....	15.70	15.70	15.70
Fuel Temp, dF .....	84.00	85.00	84.00

---

## FUEL ANALYSIS DATA :

---

	RUN 1	RUN 2	RUN 3
Btu/scf, Gross Cal. Value:	1164.00	1164.00	1164.00
Btu/lb, Gross Cal. Value :	23017.00	23017.00	23017.00
Hydrogen, Wt.% :	23.07	23.07	23.07
Carbon, Wt.% :	75.68	75.68	75.68
Sulfur, Wt.% :	0.00	0.00	0.00
Nitrogen, Wt.% :	0.58	0.58	0.58
Oxygen, Wt.% :	0.67	0.67	0.67

---

## CALCULATIONS :

---

	RUN 1	RUN 2	RUN 3	AVERAGE
F-Factor, dscf/MMBtu :	8,537.82	8,537.82	8,537.82	8,537.82
Fuel Rate, scfh :	5653.90	5643.53	5653.90	5650.44
Heat Rate, MMBtu/hr :	6.581	6.569	6.581	6.577
Flue gas flowrate, dscfm :	942.34	939.70	940.98	941.01

---

\* F-Factor =  $10E6 \times [3.64(\%H) + 1.53(\%C) + 0.57(\%S) + 0.14(\%N) - 0.46(\%O_2)] / (Btu/lb) \times [(T_{std} + 460) / 528]$

\* scfh = fuel acfh  $\times [P_b + (P_{psig} \times 2.036 \text{ in.Hg/psi}) / (T_{fuel} + 460)] \times [(T_{std} + 460) / P_{std}]$   
 where: psig = psia - 14.7

\* MMBtu/hr = scfh  $\times (Btu/scf) / 10E6$

\* dscfm = MMBtu/hr  $\times dscf/MMBtu \times (1hr/60min) \times [20.9 / (20.9 - \%O_2)]$

# FUEL / FLOWRATE CALCULATIONS

PLANT ..... SO CAL GAS GOLETA  
 SOURCE ..... UNIT #7 IN HI-LOW  
 DATE ..... OCT 12, 1992      Temp. Std.: 60  
Press. Std: 29.92

## FUEL FLOWRATE DATA :

	HI	LOW	ARB
Barometric Press., in.Hg..	29.92	29.92	29.92
Brake Horsepower .....	643.00	643.00	643.00
Fuel Flow, scfh .....			
Oxygen, % .....	0.09	0.09	0.13
Fuel Flow, acfh .....	5538.00	5538.00	5538.00
Fuel Press, psig .....	1.00	1.00	1.00
" " psia .....	15.70	15.70	15.70
Fuel Temp, dF .....	84.00	84.00	84.00

## FUEL ANALYSIS DATA :

	HI	LOW	ARB
Btu/scf, Gross Cal. Value:	1164.00	1164.00	1164.00
Btu/lb, Gross Cal. Value :	23017.00	23017.00	23017.00
Hydrogen, Wt.% :	23.07	23.07	23.07
Carbon, Wt.% :	75.68	75.68	75.68
Sulfur, Wt.% :	0.00	0.00	0.00
Nitrogen, Wt.% :	0.58	0.58	0.58
Oxygen, Wt.% :	0.67	0.67	0.67

## CALCULATIONS :

	HI	LOW	ARB
F-Factor, dscf/MMBtu :	8,537.82	8,537.82	8,537.82
Fuel Rate, scfh :	5653.90	5653.90	5653.90
Heat Rate, MMBtu/hr :	6.581	6.581	6.581
Flue gas flowrate, dscfm :	940.53	940.53	942.34

\* F-Factor =  $10E6 \times [3.64(\%H) + 1.53(\%C) + 0.57(\%S) + 0.14(\%N) - 0.46(\%O_2)] / (Btu/lb) \times [(T_{std} + 460) / 528]$

\* scfh = fuel acfh  $\times [P_b + (P_p, psig \times 2.036 \text{ in.Hg/psi}) / (T_{fuel} + 460)] \times [(T_{std} + 460) / P_{std}]$   
 where: psig = psia - 14.7

\* MMBtu/hr = scfh  $\times (Btu/scf) / 10E6$

\* dscfm = MMBtu/hr  $\times dscf/MMBtu \times (1hr/60min) \times [20.9 / (20.9 - \%O_2)]$

**EMISSION RATE CALCULATIONS**

PLANT : SO CAL GAS GOLETA  
 SOURCE : UNIT #7 INLET  
 DATE : OCT 12, 1992

Temp. Std. : 60 dF  
 Press. Std.: 29.92 in. Hg. 15 % O<sub>2</sub> Correction

	RUN 1	RUN 2	RUN 3	AVERAGE
Oxygen (%)	0.13	0.11	0.10	0.11
Q <sub>s</sub> (std), dscfm	942.34	939.70	940.98	941.01
NO <sub>x</sub> , ppm	2142.86	2197.30	2082.88	2141.01
CO, ppm	4954.64	5108.59	4925.00	4996.08
HC, ppm				
F-Factor	8537.82	8537.82	8537.82	8537.82

NO<sub>x</sub>, MW = 46.005

NO <sub>x</sub> , lb/hr	14.69	15.02	14.26	14.66
NO <sub>x</sub> , ppm @ O <sub>2</sub>	608.71	623.57	590.82	607.70
NO <sub>x</sub> , lb/MMBtu	2.2332	2.2877	2.1675	2.2295
NO <sub>x</sub> , g/HP-hr	10.19	10.51	10.06	10.25

CO, MW = 28.010

CO, lb/hr	20.68	21.26	20.53	20.82
CO, ppm @ O <sub>2</sub>	1407.43	1449.77	1397.00	1418.07
CO, lb/MMBtu	3.1437	3.2383	3.1204	3.1675
CO, g/HP-hr	14.34	14.88	14.48	14.57

\* lb/hr = 8.223E-5 x Q<sub>s</sub>(std) x MW x ppm / (T<sub>std</sub> + 460)

\* ppm @ O<sub>2</sub> = ppm measured x [(20.9 - O<sub>2</sub>% correction) / (20.9 - O<sub>2</sub> measured)]

\* lb/MMBtu = F-Factor x MW x [1.3711E-6 / (T<sub>std</sub> + 460)] x [20.9 / (20.9 - O<sub>2</sub>%)] x ppm

\* g/HP-hr = lb/hr x (453.59 g/lb) / HP

### EMISSION RATE CALCULATIONS

---

PLANT : SO CAL GAS GOLETA  
 SOURCE : UNIT #7 IN HI-LOW  
 DATE : OCT 12, 1992

Temp. Std. : 60 dF  
 Press. Std.: 29.92 in. Hg. 15 % O<sub>2</sub> Correction

---

	HI	LOW	ARB
Oxygen (%)	0.09	0.09	0.13
Q <sub>s</sub> (std), dscfm	940.53	940.53	942.34
NO <sub>x</sub> , ppm	2005.75	2360.30	2272.57
CO, ppm	6309.10	3464.84	4330.92
HC, ppm			
F-Factor	8537.82	8537.82	8537.82

NO<sub>x</sub>, MW = 46.005

NO <sub>x</sub> , lb/hr	13.72	16.15	15.58
NO <sub>x</sub> , ppm @ O <sub>2</sub>	568.67	669.19	645.55
NO <sub>x</sub> , lb/MMBtu	2.0863	2.4550	2.3683
NO <sub>x</sub> , g/HP-hr	9.68	11.39	10.99

CO, MW = 28.010

CO, lb/hr	26.28	14.43	18.08
CO, ppm @ O <sub>2</sub>	1788.74	982.34	1230.26
CO, lb/MMBtu	3.9955	2.1942	2.7480
CO, g/HP-hr	18.54	10.18	12.75

\* lb/hr = 8.223E-5 x Q<sub>s</sub>(std) x MW x ppm / (T<sub>std</sub> + 460)

\* ppm @ O<sub>2</sub> = ppm measured x [(20.9 - O<sub>2</sub>% correction) / (20.9 - O<sub>2</sub> measured)]

\* lb/MMBtu = F-Factor x MW x [1.3711E-6 / (T<sub>std</sub> + 460)] x [20.9 / (20.9 - O<sub>2</sub>%)] x ppm

\* g/HP-hr = lb/hr x (453.59 g/lb) / HP

SCOTT - MARRIN, INC.

2001 THIRD ST., UNIT H

RIVERSIDE, CALIFORNIA 92507

## REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: SP-2750-90 Rel. 47/Reanalysis

~~AAL9092~~  
CYLINDER NUMBER \_\_\_\_\_

COMPONENT	CONCENTRATION (v/v)
Nitric Oxide	4070 ± 41 ppm

NOx                  4070 ppm

Nitrogen\*           Balance

Cylinder Pressure: 1650 psig

\*Oxygen-free

(The Nitric Oxide analysis is traceable to the National Institute of Standards  
(and Technology SRM 2631, Cylinder number CAL1214. ) )



**SCOTT-MARRIN, INC.**  
2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507  
TELEPHONE (714) 784-1240

**REPORT OF ANALYSIS**  
**NIST TRACEABLE GAS MIXTURES**

STEI01

TO:

SUE POWERS  
STEINER ENVIRONMENTAL, INC.  
4930 BOYLAN ST.  
BAKERSFIELD, CA 93308

DATE: 04/12/91

CUSTOMER ORDER NUMBER: 2750-90 Rel 20

PAGE 1

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC719	Nitric Oxide Nitrogen, O <sub>2</sub> -Free NO <sub>x</sub>	8200 + 82 ppm Balance 8200 ppm	SRM 2631
CC12270	Nitric Oxide Nitrogen, O <sub>2</sub> -Free NO <sub>x</sub>	8230 + 82 ppm Balance 8230 ppm	SRM 2631

ppm = umole/mole

$\text{g} = \text{mole-}^{\frac{1}{2}}$

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above. Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

**Analyst:**

Steve Kozey

S.B. Kozy

Approved:

~~32.09/202491.~~

J.T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.

## STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS



# SCOTT-MARRIN, INC.

6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507  
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

**REPORT OF ANALYSIS**  
**NIST TRACEABLE GAS MIXTURES**

STEI01

**TO:**

SUE POWERS  
STEINER ENVIRONMENTAL SERVICES  
4930 BOYLAN ST  
BAKERSFIELD, CA 93308-

DATE: 09/30/92

CUSTOMER ORDER NUMBER: SP2750-90REI.73/Reanalysis

PAGE 1

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC7472	Nitrogen Dioxide	39.2 + 0.8 ppm	SRM 2627
	Nitrogen	Balance	
	Cylinder Pressure:	1000 psig	

ppm = umole/mole

$\frac{g}{mole}$  = mole-%

The above analysis is traceable to the National Institute of Standards and Technology by intercomparison with the reference standard listed above. Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

**Analyst:**

Steve Kozy

S.B. Kozy

**Approved:**

J.T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.

## STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

## REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: SP-2750-90REL61

PAGE 2

6/23/92

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER	EXPIRATION DATE	REPLICATE ANALYSIS DATA
<b>CYLINDER NO.: CC12572</b>					
Carbon Monoxide	2415 ± 24 ppm	GMIS	Varian Model 1200 S/N None	06/16/92 12/23/93	06/23/92 2435 ppm 2399 ppm
Nitrogen	Balance	Cylinder #	Methanation/FID		2485 ppm 2398 ppm
Cylinder Pressure:	2000 psig	FF32911	Gas Chromatography		2430 ppm 2424 ppm
		@ 2618 ppm	Last Cal Date: 04/13/92	Mean: 2423 ppm	2407 ppm
<b>CYLINDER NO.: CC12055</b>					
Carbon Monoxide	4470 ± 45 ppm	GMIS	Varian Model 1200 S/N None	06/16/92 12/23/93	06/23/92 4488 ppm 4468 ppm
Nitrogen	Balance	Cylinder #	Methanation/FID		4498 ppm 4450 ppm
Cylinder Pressure:	2000 psig	CC7245	Gas Chromatography		4458 ppm 4476 ppm
		@ 5058 ppm	Last Cal Date: 04/13/92	Mean: 4488 ppm	4468 ppm

ppm = umole/mole

% = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

SCOTT - MARRIN, INC.

2001 THIRD ST., UNIT H

RIVERSIDE, CALIFORNIA 92507

## REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: SP-2750-90 Rel. 50/Reanalysis

CYLINDER NUMBER ALM012824

## COMPONENT CONCENTRATION (v/v)

Carbon Monoxide	8170 ± 82 ppm	Replicate	01/17/92	8220 ppm
Nitrogen	Balance	Analysis		8120 ppm
		Data On		<u>8120 ppm</u>
Cylinder Pressure:	1700 psig	CO:	Mean	8150 ppm
			Expiration Date CO:	07/17/93

(The Carbon Monoxide analysis was performed in accordance with Section 3.0.4 of the )  
(revised EPA traceability protocol No. 1 dated June 9, 1987. The analysis is )  
(traceable to the National Institute of Standards and Technology by direct )  
(intercomparison with GMIS, cylinder number CC50047 at 9950 ppm Carbon Monoxide in )  
(Nitrogen. The analysis was performed using a Carle Model 8000 gas chromatograph )  
(with catalytic methanation/flame ionization detection. The last Multipoint )  
(calibration was performed 11/18/91.

SCOTT - MARRIN, INC.

2001 THIRD ST., UNIT H

RIVERSIDE, CALIFORNIA 92507

## REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: SP-2750-90 Rel. 50/Reanalysis

---

### CHRONOLOGICAL RECORD OF CERTIFIED CONCENTRATIONS

CYLINDER NUMBER: ALM012824

DATE	Carbon Monoxide		
06/05/90	8210 ppm		
06/12/90	8160 ppm		
01/17/92	8150 ppm		
AVERAGE	8170 ppm		



**SCOTT-MARRIN, INC.**  
2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507  
TELEPHONE (714) 784-1240

**REPORT OF ANALYSIS**  
**NIST TRACEABLE GAS MIXTURES**

STEI01

**TO:**

SUE POWERS  
STEINER ENVIRONMENTAL, INC.  
4930 BOYLAN STREET  
BAKERSFIELD, CA 93308

DATE: 11/18/91

CUSTOMER ORDER NUMBER: SP-2750-90REF141

PAGE 1

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC265	Carbon Monoxide	399 + 4 ppm	SRM 1680b
	Carbon Dioxide	9.15 + 0.09 %	SRM 1675b
	Oxygen	0.975 + 0.010 %	SRM 2657
	Nitrogen	Balance	
CC89601	Carbon Monoxide	39.8 + 0.4 ppm	SRM 2614a
	Oxygen	3.48 + 0.03 %	SRM 2658a
	Carbon Dioxide	15.15 + 0.15 %	SRM 1675b
	Nitrogen	Balance	

ppm = umole/mole

$\dot{N} = \text{mole}^{-1}$

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above. Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAF 232.09/202491.

Analyst:

alytical balance NIST Re  
M. C. H.

M.S. Calhoun

Approved:

J.T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.

## STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS



**SCOTT-MARRIN, INC.**  
2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507  
TELEPHONE (714) 784-1240

**REPORT OF ANALYSIS**  
**NIST TRACEABLE GAS MIXTURES**

STEI01

**TO:**

SUE POWERS  
STEINER ENVIRONMENTAL, INC.  
4950 BOYLAN STREET  
BAKERSFIELD, CA 93308

DATE: 11/18/91

CUSTOMER ORDER NUMBER: SP-2750-90REI 12

PAGE 1

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC4Ø111	Carbon Monoxide	392 + 4 ppm	SRM 1680b
	Oxygen	3.85 + 0.04 %	SRM 2658a
	Carbon Dioxide	15.20 + 0.15 %	SRM 1675b
	Nitrogen	Balance	

ppm = umole/mole

$\frac{\%}{\text{mole-}\%}$

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above. Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

**Analyst:**

*M. C. C.*

M.S. Calhoun

Approved:

J. T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.

**APPENDIX B**  
**STEINER ENVIRONMENTAL OUTLET DATA**

## CONTINUOUS MONITOR DATA SHEET

Plant Soil - Goss - Goss-lett

Date 10-12-92 Run No. Preliminary + 1

Test Location Unit #7 outlet  
operator [redacted]

Operator ER Fuel Type NGV: GRSS Trailer No 3

LITERATURE

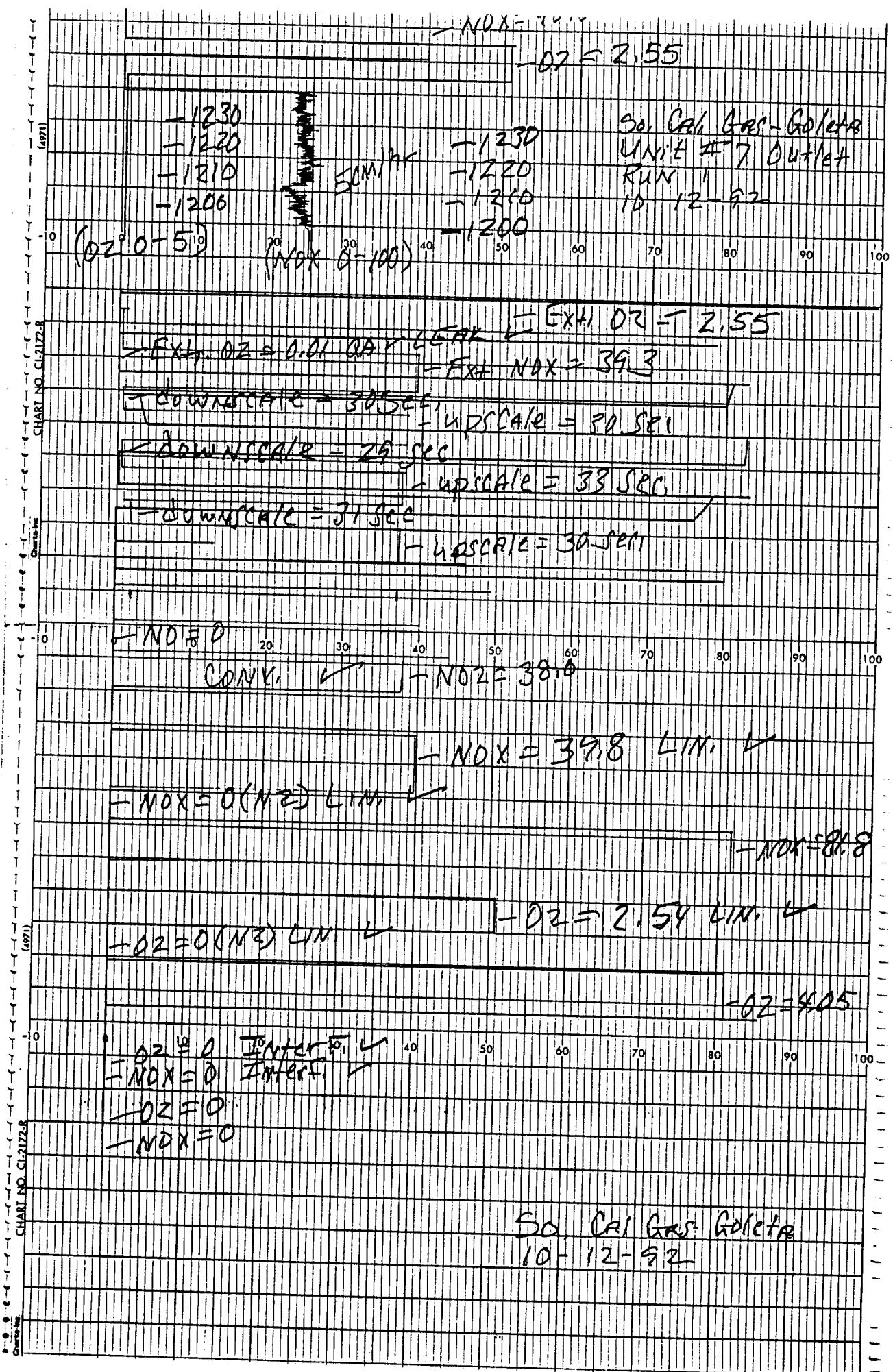
APCD Witness/Number Jim McCarthy  
Client Rep \_\_\_\_\_  
Generator Type \_\_\_\_\_  
Burner Type \_\_\_\_\_  
O<sub>2</sub> Controller Type \_\_\_\_\_

Dry Uncorrected							
Time	Sample Point	O <sub>2</sub> %	CO <sub>2</sub> ppm	CO ppm	SO <sub>2</sub> ppm	NO ppm	NO <sub>x</sub> ppm
	4.05	17.42	8140			81.80	
	2.545	9.70	3980			40.00	
	0.0	0.0	0.0			0.0	
	0.0	0.0	0.0			0.0	
	4.05	17.42	8140			81.80	
	2.545	9.68	3950			3980	
	0.0	0.0	0.0			0.0	
	2.55	9.53	3940			39.30	
	0.01						
	0.02	11.80	3400			33.40	
	10	0.02	11.79	3550		33.90	
	20	0.02	11.79	3550		24.00	
	30	0.02	11.80	3400		23.60	
	1200						
	10						
	20						
	30						
	1240						

Comments	Miscellaneous Information
IGH	CALIBRATION GASES
NID	NO <sub>x</sub> CC40033 CC65279
ERO	SO <sub>2</sub> CONC 9.78 - CC7418
	CO CC91374 CC56876
Interference Check	CO/CO <sub>2</sub> CC73174 CC28045 ALM12.8%
IGH	Wet Bulb: _____ Dry Bulb: _____
NID	Barometric Press: _____
ERO	RESPONSE TIME
	Upscale: 30 DOWNSCALE: 31
	Upscale: 33 DOWNSCALE: 29
	Upscale: 30 DOWNSCALE: 30
	PROCESS DATA
	Fuel Flow: _____
	Steam Flow: _____
	Rating: _____
	External Response
	A ↘ L ↗ K ↙
	WAN 1
	28954
	ERO
	CONVERTER GAS
	Cal Gas Values   Actual Values
	NO 0.0   0.6
	NO <sub>2</sub> 37.9   38.0
	Conv. Efficiency: _____



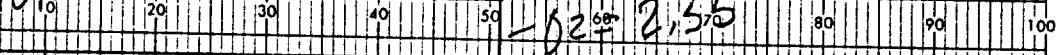




$$\begin{aligned} -O_2 &= 0 \\ -NOX &= 0 \end{aligned}$$

1 YU

$$\begin{aligned} -O_2 &= 0 \\ -NOX &= 0 \end{aligned}$$



$$-NOX = 39.75$$

-1415  
-1405  
-1355  
-1395

-1415  
-1405  
-1365  
-1345

San. Car. Gas. Goleto  
UNIT #7 OUTLET  
RUN 2  
10-12-92

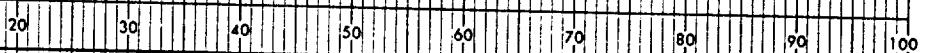
(O2 0-5)

(NOX 0-100)

~~$$-NOX = 40.0$$~~

~~$$-O_2 = 2.545$$~~

$$\begin{aligned} -O_2 &= 0 \\ -NOX &= 0 \end{aligned}$$



-1502  
-1252

-1302  
-1252

(O2 0-5)

(NOX 0-100)

$$-O_2 = 2.545$$

$$\begin{aligned} -O_2 &= 0 \\ -NOX &= 0 \end{aligned}$$

$$-NOX = 40.0$$

$$\begin{aligned} -O_2 &= 0 \\ -NOX &= 0 \end{aligned}$$

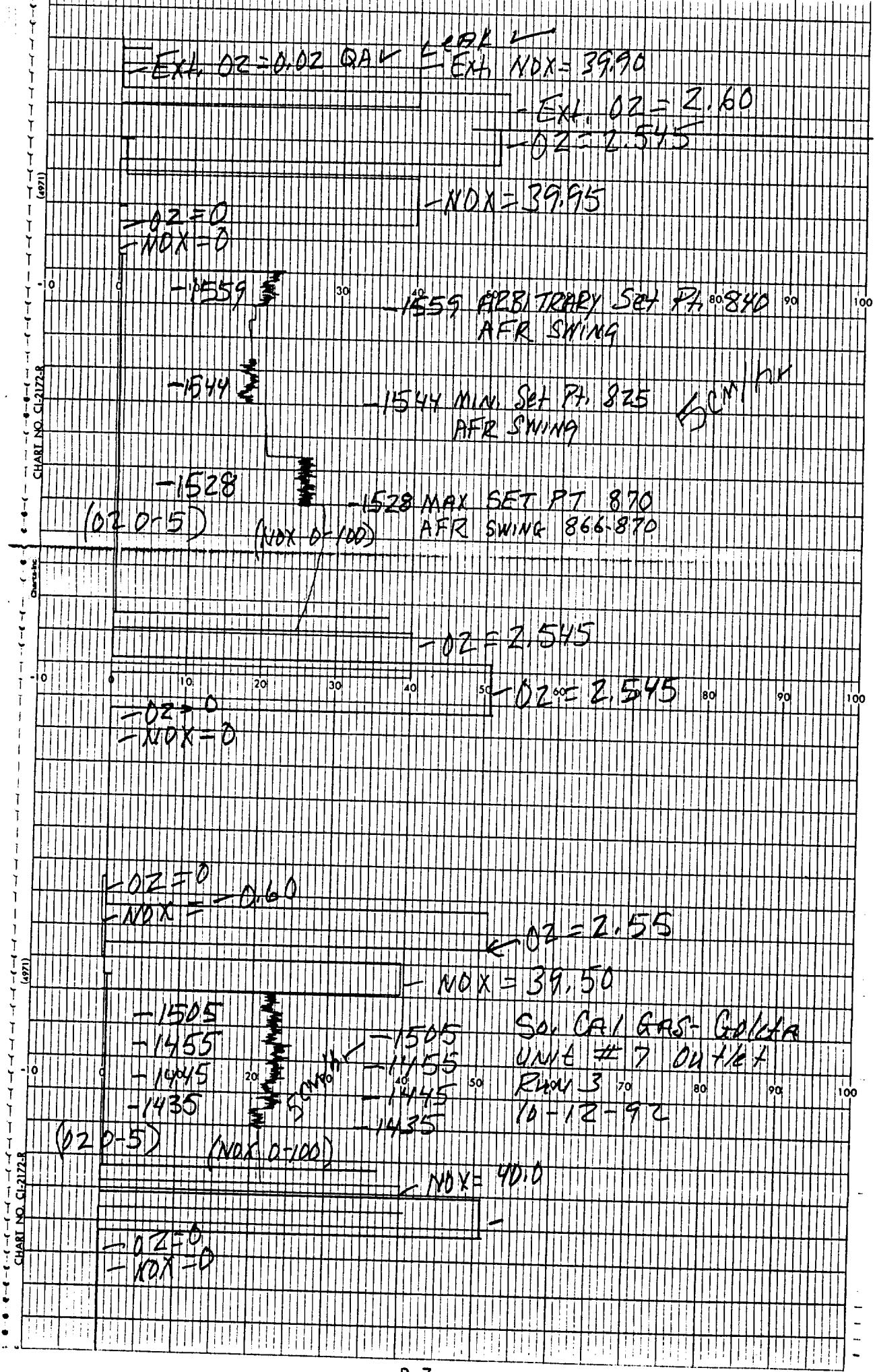
$$\begin{aligned} -O_2 &= 0 \\ -NOX &= 0.20 \end{aligned}$$

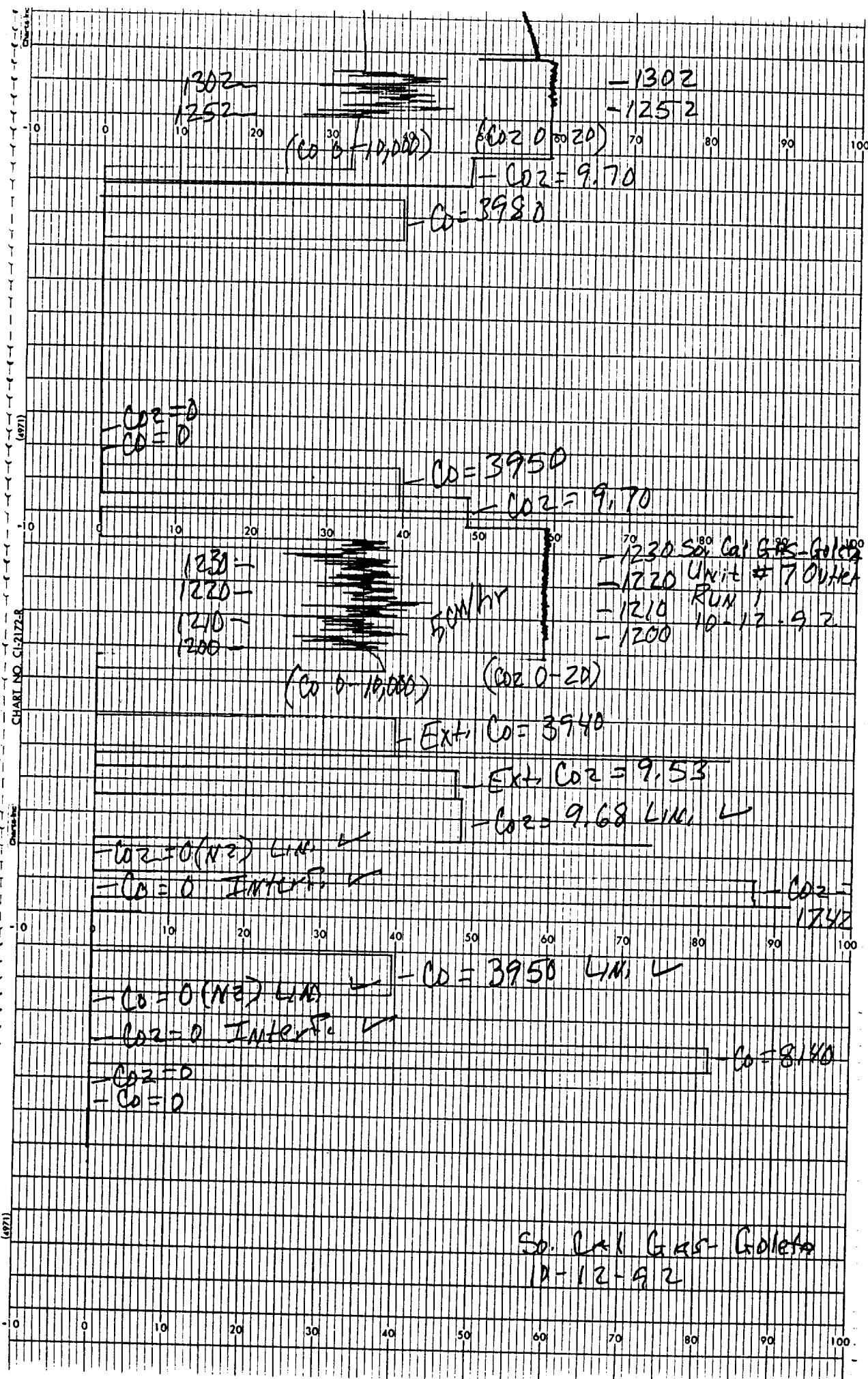
$$-NOX = 40.10$$

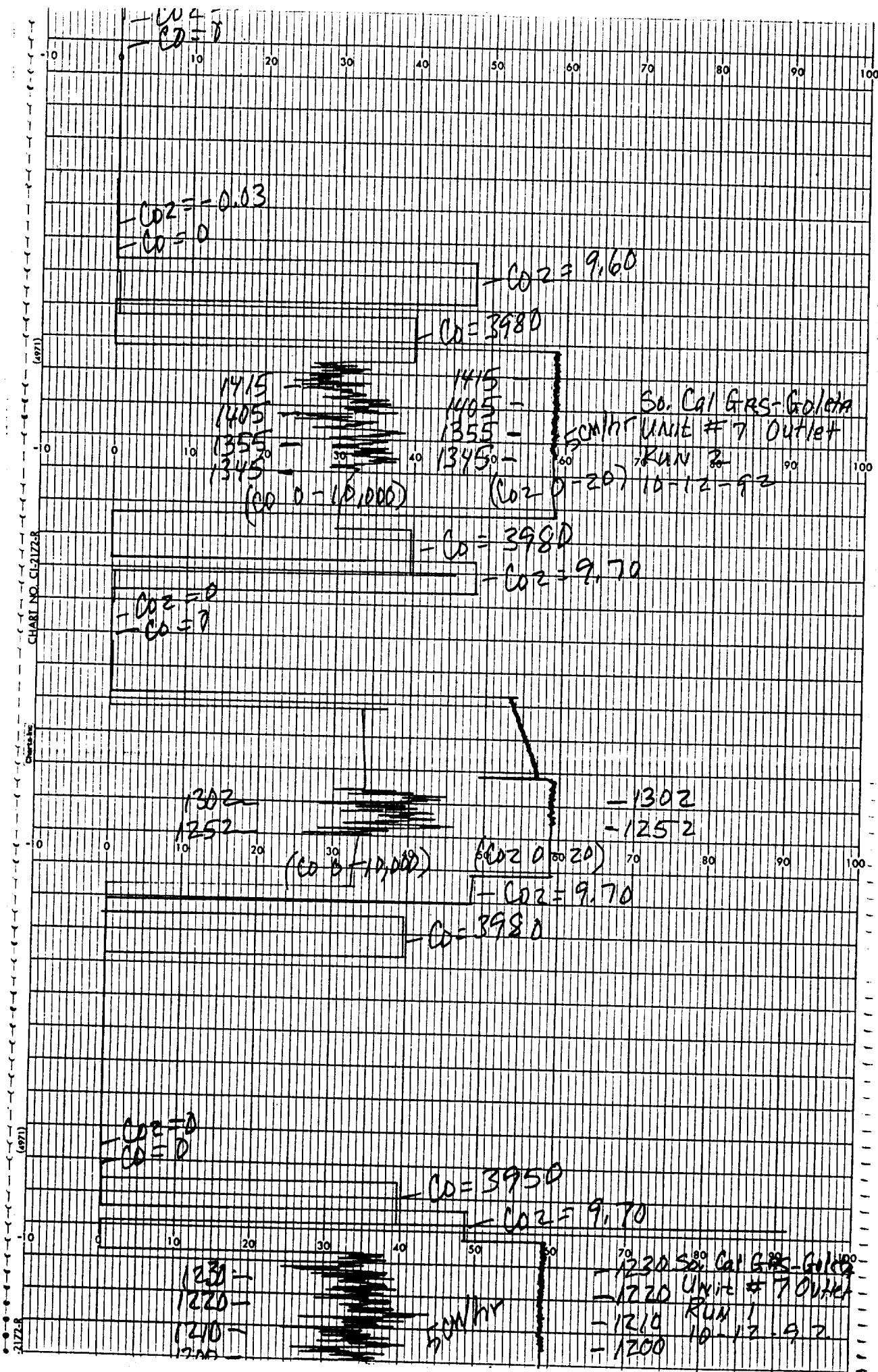
$$-O_2 = 2.55$$

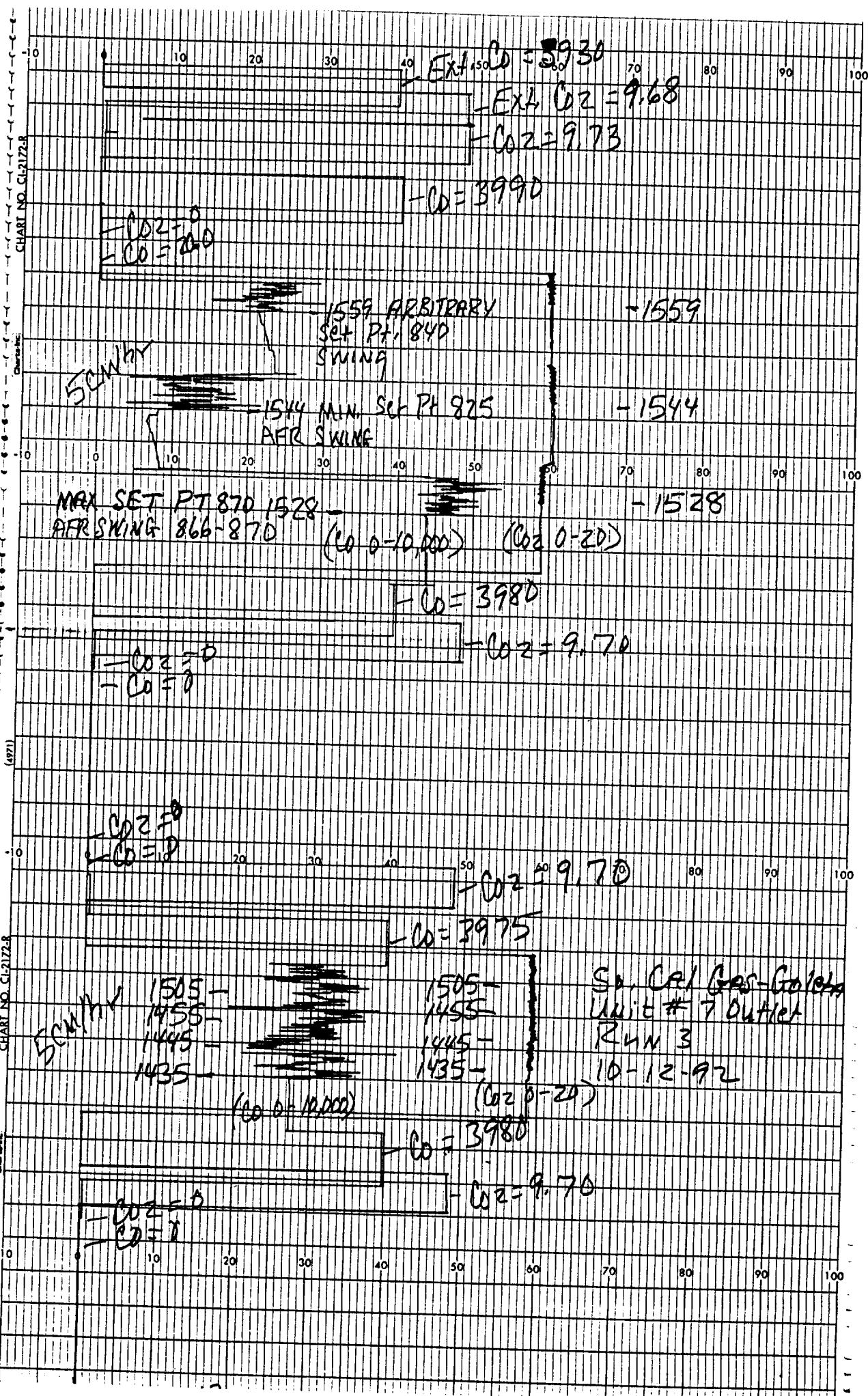
-1230

San. Car. Gas. Goleto









## A. CALIBRATION AND CORRECTION DATA

Company : SO CAL GAS GOLETA

Station : UNIT #7 OUTLET

Date : 10/12/92  
Test Run : 1  
Test Condition:

## Concentration : Drift Uncorrected (A) / Corrected (B)

Point #	%O2		%CO2		PPM CO		PPM SO2		PPM NOX	
	A	B	A	B	A	B	A	B	A	B
1	0.02	0.02	11.80		3400.00	3403.21			23.40	23.39
2	0.02	0.02	11.79		3550.00	3560.06			23.90	23.87
3	0.02	0.02	11.79		3550.00	3566.80			24.00	23.95
4	0.02	0.02	11.80		3400.00	3422.57			23.60	23.53
MEAN	0.02		11.80				3488.16			23.68

	%O2	%CO2	PPM CO	PPM SO2	PPM NOX
Zero Check	0.00	0.00	0.00	0.00	0.20
Span Check	2.55	9.70	3950.00	40.00	
Cal. Gas	2.55	9.70	3980.00	40.00	
Scf	0.00049		-0.00188	-0.00125	
Zcf	0.00000		0.00000	0.05000	

Scf, Span Drift Correction Factor = (% Drift / 100) / # of Readings

Zcf, Zero Drift Correction Factor = Zero Drift / # of Readings

Cz, Zero Corr. Concentration = measured value - [Zcf x (Point # - 0.5)]

B, Corrected Concentration = Cz / [1 + (Scf x (Point # - 0.5))]

## A. CALIBRATION AND CORRECTION DATA

Company : SO CAL GAS GOLETA

Station : UNIT #7 OUTLET

Date :

10/12/92

Test Run :

2

Test Condition:

Concentration : Drift Uncorrected (A) / Corrected (B)										
Point #	%O2		%CO2		ppm CO		ppm SO2		ppm NOx	
	A	B	A	B	A	B	A	B	A	B
1	0.03	0.03	11.70	11.71	3350.00				23.50	23.52
2	0.02	0.02	11.70	11.74	3300.00				22.00	22.05
3	0.02	0.02	11.70	11.77	3100.00				22.20	22.29
4	0.02	0.02	11.72	11.82	2900.00				21.85	21.97
MEAN		0.02			11.76	3162.50			22.46	

	%O2	%CO2	ppm CO	ppm SO2	ppm NOx
Zero Check	0.00	-0.03	0.00	0.00	0.00
Span Check	2.55	9.60	3980.00	39.75	
Cal. Gas	2.55	9.70	3980.00	40.00	
Scf	0.000049	-0.00180		-0.00156	
Zcf	0.000000	-0.00750		0.000000	

Scf, Span Drift Correction Factor = (% Drift / 100) / # of Readings

Zcf, Zero Drift Correction Factor = Zero Drift / # of Readings

Cz, Zero Corr. Concentration = measured value - [Zcf x (Point # - 0.5)]

B, Corrected Concentration = Cz / [1 + (Scf x (Point # - 0.5))]

## A. CALIBRATION AND CORRECTION DATA

Company : SO CAL GAS GOLETA

Station : UNIT #7 OUTLET

Date : 10/12/92  
Test Run : 3  
Test Condition:

Concentration : Drift Uncorrected (A) / Corrected (B)										
Point #	%O2		%CO2		ppm CO		ppm SO2		ppm NOx	
	A	B	A	B	A	B	A	B	A	B
1	0.02	0.02	11.80	3000.00	3000.47	22.00	22.07			
2	0.02	0.02	11.80	2800.00	2801.32	23.10	23.30			
3	0.02	0.02	11.80	3250.00	3252.55	23.00	23.34			
4	0.02	0.02	11.80	3150.00	3153.47	22.90	23.37			
MEAN	0.02		11.80		3051.95		23.02			

Concentration : Drift Uncorrected (A) / Corrected (B)										
Point #	%O2		%CO2		ppm CO		ppm SO2		ppm NOx	
	A	B	A	B	A	B	A	B	A	B
Zero Check	0.00		0.00		0.00		0.00		-0.60	
Span Check	2.55		9.70		3975.00		3980.00		39.50	
Cal. Gas	2.55		9.70						40.00	
Scf	0.00049				-0.00031		0.00062			
Zcf	0.00000				0.00000				-0.15000	

Scf, Span Drift Correction Factor = (% Drift / 100) / # of Readings  
 Zcf, Zero Drift Correction Factor = Zero Drift / # of Readings  
 Cz, Zero Corr. Concentration = measured value - [Zcf x (Point # - 0.5)]  
 B, Corrected Concentration = Cz / [1 + (Scf x (Point # - 0.5)) ]

## A. CALIBRATION AND CORRECTION DATA

Company : SO CAL GAS GOLETA

Station : UNIT #7 OUTLET HI-LO

Date : 10/12/92

Test Run : 1

Test Condition:

Concentration : Drift Uncorrected (A) / Corrected (B)										
Point #	%O2		%CO2		ppm CO		ppm SO2		ppm NOX	
	A	B	A	B	A	B	A	B	A	B
1	0.02		11.80	11.79	4650.00	4648.61			25.60	25.61
2	0.02		12.05	12.03	1350.00	1341.69			18.00	18.01
3	0.02		11.95	11.92	2300.00	2288.12			20.20	20.22
MEAN	0.02						11.91	2759.47		21.28

Concentration : Drift Uncorrected (A) / Corrected (B)										
Point #	%O2		%CO2		ppm CO		ppm SO2		ppm NOX	
	A	B	A	B	A	B	A	B	A	B
Zero Check	0.00		0.00				20.00		0.00	
Span Check	2.55		9.73				3990.00		39.95	
Cal. Gas	2.55		9.70				3980.00		40.00	
Scf			0.00103				-0.00084		-0.00042	
Zcf			0.00000					6.66667	0.00000	

Scf, Span Drift Correction Factor = (% Drift / 100) / # of Readings

Zcf, Zero Drift Correction Factor = Zero Drift / # of Readings

Cz, Zero Corr. Concentration = measured value - [Zcf x (Point # - 0.5)]

B, Corrected Concentration = Cz / [1 + (Scf x (Point # - 0.5))]

B. ZERO AND SPAN DRIFT PERCENT CALCULATIONS

Company : SO CAL GAS GOLETA Date : 10/12/92

Station : UNIT #7 OUTLET

Run	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span	2.55	9.70	3980.00		40.00
Measured Span	2.55	9.70	3950.00		40.00
Zero Drift	0.00	0.00	0.00		0.20
Final, Actual Span	2.55	9.70	3950.00		39.80
Percent Drift	0.2	0.0	-0.8		-0.5
*****	*****	*****	*****	*****	*****
Run	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span	2.55	9.70	3980.00		40.00
Measured Span	2.55	9.60	3980.00		39.75
Zero Drift	0.00	-0.03	0.00		0.00
Final, Actual Span	2.55	9.63	3980.00		39.75
Percent Drift	0.2	-0.7	0.0		-0.6
*****	*****	*****	*****	*****	*****
Run	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span	2.55	9.70	3980.00		40.00
Measured Span	2.55	9.70	3975.00		39.50
Zero Drift	0.00	0.00	0.00		-0.60
Final, Actual Span	2.55	9.70	3975.00		40.10
Percent Drift	0.2	0.0	-0.1		0.2

Final, Actual Span = Measured Span - Zero Drift

Percent Drift = (Final, Actual Span - Initial Span) / Initial Span x 100

B. ZERO AND SPAN DRIFT PERCENT CALCULATIONS

Company : SO CAL GAS GOLETA Date : 10/12/92

Station : UNIT #7 OUTLET HI-LO

Run 1	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span	2.55	9.70	3980.00		40.00
Measured Span	2.55	9.73	3990.00		39.95
Zero Drift	0.00	0.00	20.00		0.00
Final, Actual Span	2.55	9.73	3970.00		39.95
Percent Drift	0.0	0.3	-0.3		-0.1
*****	*****	*****	*****	*****	*****
Run 2	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span					
Measured Span					
Zero Drift					
Final, Actual Span					
Percent Drift					
*****	*****	*****	*****	*****	*****
Run 3	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span					
Measured Span					
Zero Drift					
Final, Actual Span					
Percent Drift					

Final, Actual Span = Measured Span - Zero Drift

Percent Drift = (Final, Actual Span - Initial Span) / Initial Span x 100

**Steiner Environmental, Inc.**

Date: 10-12-92

Test Location: Sd. Cr1 Gas-Geo Test  
Unit 7 Outlet

**SAMPLE HANDLING/LOG-IN**

NO	SAMPLE TYPE	VOLUME	COMMENTS
1	28954 <u>ASTM HC</u> Meth Sample <u>1</u> Test		
2	28955 <u>ASTM HC</u> Meth Sample <u>2</u> Test		
3	28956 <u>ASTM HC</u> Meth Sample <u>3</u> Test		
4	28957 <u>ASTM HC</u> Meth Sample <u>4</u> Test		
5	28958 <u>ASTM HC</u> Meth Sample <u>5</u> Test		
6	28959 <u>ASTM F.G. All</u> Meth Sample Test		
7			
8			
9			
10			
11			
12			

**CHAIN-OF-CUSTODY**

Signature

Charl Reshard

Date/Time

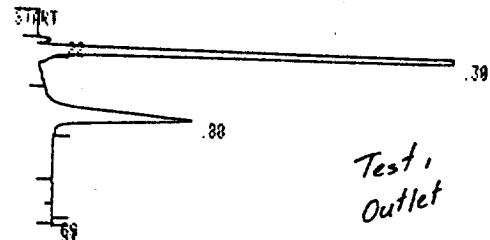
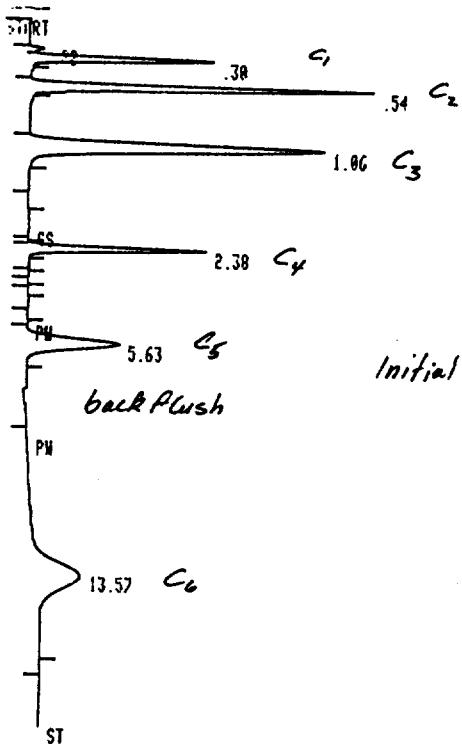
10-13-92/0800

Signature

Date/Time

John

10-13-92 @0955



RUN # 3  
ID 28954-1 OCT/13/92 09:57:09

ESTD  

RT	AREA	TYPE	CAL#	AMOUNT
0.22	170	PY	2	0.656
0.39	31706	VB	IR	145.660 C,
0.88	7941	PB		36.482 >C,

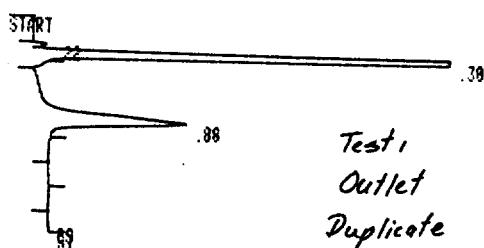
TOTAL AREA= 39812  
MUL FACTOR= 1.0000E+00

RUN # 1 OCT/13/92 08:26:48

AREAX  

RT	AREA	TYPE	AR/HT	AREA%
0.22	259	PY	0.034	0.266
0.39	4521	VB	0.043	4.644 C,
0.54	8778	PB	0.044	9.016
1.06	13477	BB	0.079	13.843
2.38	18405	BB	0.178	18.905
5.63	23009	PB	0.428	23.634
13.57	28907	PB	1.110	29.692

TOTAL AREA= 97356  
MUL FACTOR= 1.0000E+00



RUN # 1 OCT/13/92 08:26:48

ESTD  

RT	AREA	TYPE	CAL#	AMOUNT
0.22	259	PY	2	1.000
0.39	4521	VB	IR	29.770 C,
0.54	8778	PB		40.327
1.06	13477	BB		61.915
2.38	18405	BB		84.554
5.63	23009	PB		105.710
13.57	28907	PB		132.800

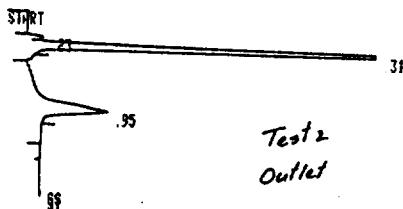
TOTAL AREA= 97356  
MUL FACTOR= 1.0000E+00

RUN # 4  
ID 28954-1 OCT/13/92 10:01:06

ESTD  

RT	AREA	TYPE	CAL#	AMOUNT
0.22	183	PY	2	0.707
0.39	31702	VB	IR	145.640 C,
0.88	8215	PB		37.741 >C,

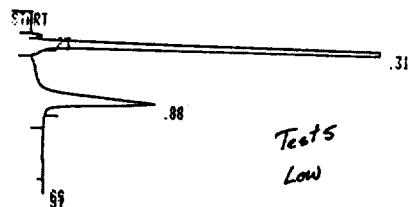
TOTAL AREA= 40100  
MUL FACTOR= 1.0000E+00



RUN # 5 OCT/13/92 10:04:37  
ID 28955-2

ESTD			
RT	AREA TYPE	CAL#	AMOUNT
0.23	241 PV	2	0.931
0.31	17944 VB IR		82.432 C <sub>1</sub>
0.95	5655 PB		25.988 >C <sub>2</sub>

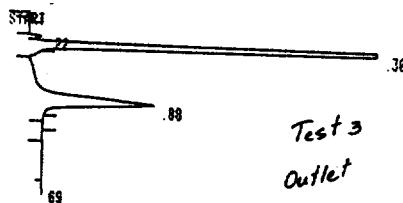
TOTAL AREA= 23840  
MUL FACTOR= 1.0000E+00



RUN # 8 OCT/13/92 10:14:27  
ID 28958-5

ESTD			
RT	AREA TYPE	CAL#	AMOUNT
0.23	128 PP	2	0.494
0.31	31130 PB	IR	143.018 C <sub>1</sub>
0.88	7863 PB		36.123 >C <sub>2</sub>

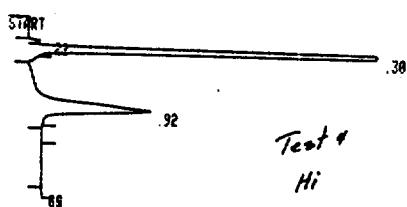
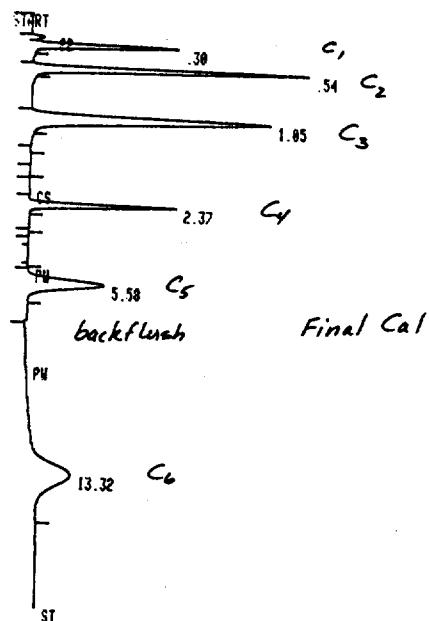
TOTAL AREA= 39121  
MUL FACTOR= 1.0000E+00



RUN # 6 OCT/13/92 10:07:51  
ID 28956-3

ESTD			
RT	AREA TYPE	CAL#	AMOUNT
0.22	177 PV	2	0.683
0.30	30932 VB IR		142.118 C <sub>1</sub>
0.88	7914 PB		36.358 >C <sub>2</sub>

TOTAL AREA= 39023  
MUL FACTOR= 1.0000E+00



RUN # 7 OCT/13/92 10:11:13  
ID 28957-4

ESTD			
RT	AREA TYPE	CAL#	AMOUNT
0.22	152 PV	2	0.587
0.30	30382 VB IR		139.388
0.92	8307 PB		38.163

TOTAL AREA= 38841  
MUL FACTOR= 1.0000E+00

RUN # 9 OCT/13/92 10:18:23  
ID ---

ESTD			
RT	AREA TYPE	CAL#	AMOUNT
0.22	278 PV	2	1.073
0.30	4308 VB	IR	19.791 C <sub>1</sub>
0.54	8398 BB		38.581
1.05	12967 PB		59.572
2.37	18134 BB		83.309
5.58	22485 PB		103.300
13.32	29002 BB		133.240

TOTAL AREA= 95572  
MUL FACTOR= 1.0000E+00

#### E. HYDROCARBON DATA

**PLANT** : SO CAL GAS GOLETA                    **DATE** : 10/12/92  
**SOURCE** : UNIT #7 OUTLET

## CALIBRATIONS

Methane Calibration gas = 20.77 ppm

	Area Count	ppm	
Initial Cal.	4521	20.77	C1
Final Cal. Check	4308	19.79	C1

% cal. diff. = 4.71  
ppm/area count = 4.59E-03

## SAMPLES

A R E A C O U N T S						p p m		
Run. No.		1	2	3		1	2	3
HC	C1	31706	17944	30932		145.66	82.44	142.11
HC	>C1	7941	5655	7914		36.48	25.98	36.36
"	"							
"	"							
"	"							
Total HC >C1 =		7941	5655	7914		36.48	25.98	36.36

l b / h r

Run. No.		1	2	3
HC	C1	0.35	0.20	0.34
HC	>C1	0.09	0.06	0.09
"				
"				
"				
"				
Total HC >C1 =		0.09	0.06	0.09

### E. HYDROCARBON DATA

PLANT : SO CAL GAS GOLETA DATE : 10/12/92  
 SOURCE : UNIT #7 OUTLET HI-LO

#### CALIBRATIONS

Methane Calibration gas = 20.77 ppm

	Area Count	ppm	
Initial Cal.	4521	20.77	C1
Final Cal. Check	4308	19.79	C1

% cal. diff. = 4.71  
 ppm/area count = 4.59E-03

#### SAMPLES

A R E A C O U N T S				p p m	
Run. No.	HI	LOW	HI	LOW	
HC C1	30382	31130	139.58	143.01	
HC >C1	8307	7683	38.16	35.30	
"					
"					
"					
"					
Total HC >C1 =	8307	7683	38.16	35.30	

1 b / h r

Run. No.	HI	LOW
HC C1	0.33	0.34
HC >C1	0.09	0.08
"		
"		
"		
"		
Total HC >C1 =	0.09	0.08

# FUEL / FLOWRATE CALCULATIONS

---

PLANT ..... SO CAL GAS GOLETA  
 SOURCE ..... UNIT #7 OUTLET Temp. Std.: 60  
 DATE ..... OCT 12, 1992 Press. Std: 29.92

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## FUEL FLOWRATE DATA :

---

	RUN 1	RUN 2	RUN 3
Barometric Press., in.Hg..	29.92	29.92	29.92
Brake Horsepower .....	654.00	648.00	643.00
Fuel Flow, scfh .....			
Oxygen, % .....	0.02	0.02	0.02
Fuel Flow, acfh .....	5538.00	5538.00	5538.00
Fuel Press, psig .....	1.00	1.00	1.00
" " psia .....	15.70	15.70	15.70
Fuel Temp, dF .....	84.00	85.00	84.00

---

## FUEL ANALYSIS DATA :

---

	RUN 1	RUN 2	RUN 3
Btu/scf, Gross Cal. Value:	1164.00	1164.00	1164.00
Btu/lb, Gross Cal. Value :	23017.00	23017.00	23017.00
Hydrogen, Wt.% :	23.07	23.07	23.07
Carbon, Wt.% :	75.68	75.68	75.68
Sulfur, Wt.% :	0.00	0.00	0.00
Nitrogen, Wt.% :	0.58	0.58	0.58
Oxygen, Wt.% :	0.67	0.67	0.67

---

## CALCULATIONS :

---

	RUN 1	RUN 2	RUN 3	AVERAGE
F-Factor, dscf/MMBtu :	8,537.82	8,537.82	8,537.82	8,537.82
Fuel Rate, scfh :	5653.90	5643.53	5653.90	5650.44
Heat Rate, MMBtu/hr :	6.581	6.569	6.581	6.577
Flue gas flowrate, dscfm :	937.37	935.65	937.37	936.80

---

\* F-Factor =  $10E6 \times [3.64(\%H) + 1.53(\%C) + 0.57(\%S) + 0.14(\%N) - 0.46(\%O_2)] / (Btu/lb) \times [(T_{std} + 460) / 528]$

\* scfh = fuel acfh  $\times [P_b + (P_{psig} \times 2.036 \text{ in.Hg/psi}) / (T_{fuel} + 460)] \times [(T_{std} + 460) / P_{std}]$   
 where: psig = psia - 14.7

MMBtu/hr = scfh  $\times (Btu/scf) / 10E6$

\* dscfm = MMBtu/hr  $\times dscf/MMBtu \times (1hr/60min) \times [20.9 / (20.9 - \%O_2)]$

# FUEL / FLOWRATE CALCULATIONS

PLANT .....	SO CAL GAS GOLETA		
SOURCE .....	UNIT #7 OUT HI-LO	Temp. Std.:	60
DATE .....	OCT 12, 1992	Press. Std.:	29.92

## FUEL FLOWRATE DATA :

	HI	LOW	ARB
Barometric Press., in.Hg..	29.92	29.92	29.92
Brake Horsepower .....	643.00	643.00	643.00
Fuel Flow, scfh .....			
Oxygen, % .....	0.02	0.02	0.02
Fuel Flow, acfh .....	5538.00	5538.00	5538.00
Fuel Press, psig .....	1.00	1.00	1.00
" " psia .....	15.70	15.70	15.70
Fuel Temp, dF .....	84.00	84.00	84.00

## FUEL ANALYSIS DATA :

	HI	LOW	ARB
Btu/scf, Gross Cal. Value:	1164.00	1164.00	1164.00
Btu/lb, Gross Cal. Value :	23017.00	23017.00	23017.00
Hydrogen, Wt.% :	23.07	23.07	23.07
Carbon, Wt.% :	75.68	75.68	75.68
Sulfur, Wt.% :	0.00	0.00	0.00
Nitrogen, Wt.% :	0.58	0.58	0.58
Oxygen, Wt.% :	0.67	0.67	0.67

## CALCULATIONS :

	HI	LOW	ARB
F-Factor, dscf/MMBtu :	8,537.82	8,537.82	8,537.82
Fuel Rate, scfh :	5653.90	5653.90	5653.90
Heat Rate, MMBtu/hr :	6.581	6.581	6.581
Flue gas flowrate, dscfm :	937.37	937.37	937.37

$$* \quad F\text{-Factor} = 10E6 \times [3.64(\%H) + 1.53(\%C) + 0.57(\%S) + 0.14(\%N) - 0.46(\%O_2)] / (Btu/lb) \times [(T_{std} + 460) / 528]$$

$$* \quad \text{scfh} = \text{fuel acfh} \times [P_b + (P_{psig} \times 2.036 \text{ in.Hg/psi}) / (T_{fuel} + 460)] \times [(T_{std} + 460) / P_{std}] \\ \text{where: } psig = psia - 14.7$$

$$* \quad \text{MMBtu/hr} = \text{scfh} \times (\text{Btu/scf}) / 10E6$$

$$* \quad \text{dscfm} = \text{MMBtu/hr} \times \text{dscf/MMBtu} \times (1\text{hr}/60\text{min}) \times [20.9 / (20.9 - \%O_2)]$$

EMISSION RATE CALCULATIONS

---

PLANT : SO CAL GAS GOLETA  
 SOURCE : UNIT #7 OUTLET  
 DATE : OCT 12, 1992

Temp. Std. : 60 dF  
 Press. Std.: 29.92 in. Hg. 15 % O<sub>2</sub> Correction

---

	RUN 1	RUN 2	RUN 3	AVERAGE
Oxygen (%)	0.02	0.02	0.02	0.02
Q <sub>s</sub> (std), dscfm	937.37	935.65	937.37	936.80
NO <sub>x</sub> , ppm	23.68	22.46	23.02	23.05
CO, ppm	3488.16	3162.50	3051.95	3234.20
HC, ppm	36.48	25.98	36.36	32.94
F-Factor	8537.82	8537.82	8537.82	8537.82

NO<sub>x</sub>, MW = 46.005

NO <sub>x</sub> , lb/hr	0.16	0.15	0.16	0.16
NO <sub>x</sub> , ppm @ O <sub>2</sub>	6.69	6.35	6.50	6.51
NO <sub>x</sub> , lb/MMBtu	0.0245	0.0233	0.0239	0.0239
NO <sub>x</sub> , g/HP-hr	0.11	0.11	0.11	0.11

CO, MW = 28.010

CO, lb/hr	14.48	13.11	12.67	13.42
CO, ppm @ O <sub>2</sub>	985.64	893.62	862.38	913.88
CO, lb/MMBtu	2.2016	1.9961	1.9263	2.0413
CO, g/HP-hr	10.04	9.17	8.94	9.39

HC, MW = 16.043

HC, lb/hr	0.09	0.06	0.09	0.08
HC, ppm @ O <sub>2</sub>	10.31	7.34	10.27	9.31
HC, lb/MMBtu	0.0132	0.0094	0.0131	0.0119
HC, g/HP-hr	0.06	0.04	0.06	0.05

\* lb/hr = 8.223E-5 x Q<sub>s</sub>(std) x MW x ppm / (T<sub>std</sub> + 460)

\* ppm @ O<sub>2</sub> = ppm measured x [(20.9 - O<sub>2</sub>% correction) / (20.9 - O<sub>2</sub> measured)]

\* lb/MMBtu = F-Factor x MW x [1.3711E-6 / (T<sub>std</sub> + 460)] x [20.9 / (20.9 - O<sub>2</sub>%)] x ppm

\* g/HP-hr = lb/hr x (453.59 g/lb) / HP

EMISSION RATE CALCULATIONS

---

PLANT : SO CAL GAS GOLETA  
 SOURCE : UNIT #7 OUT HI-LO  
 DATE : OCT 12, 1992

Temp. Std. : 60 dF  
 Press. Std.: 29.92 in. Hg. 15 % O<sub>2</sub> Correction

---

	HI	LOW	ARB
Oxygen (%)	0.02	0.02	0.02
Q <sub>s</sub> (std), dscfm	937.37	937.37	937.37
NO <sub>x</sub> , ppm	25.61	18.01	20.22
CO, ppm	4648.61	1341.69	2288.12
HC, ppm	38.16	36.12	
F-Factor	8537.82	8537.82	8537.82

NO<sub>x</sub>, MW = 46.005

NO <sub>x</sub> , lb/hr	0.17	0.12	0.14
NO <sub>x</sub> , ppm @ O <sub>2</sub>	7.24	5.09	5.71
NO <sub>x</sub> , lb/MMBtu	0.0265	0.0187	0.0210
NO <sub>x</sub> , g/HP-hr	0.12	0.09	0.10

CO, MW = 28.010

CO, lb/hr	19.30	5.57	9.50
CO, ppm @ O <sub>2</sub>	1313.54	379.12	646.55
CO, lb/MMBtu	2.9340	0.8468	1.4442
CO, g/HP-hr	13.62	3.93	6.70

HC, MW = 16.043

HC, lb/hr	0.09	0.09
HC, ppm @ O <sub>2</sub>	10.78	10.21
HC, lb/MMBtu	0.0138	0.0131
HC, g/HP-hr	0.06	0.06

\* lb/hr = 8.223E-5 x Q<sub>s</sub>(std) x MW x ppm / (T<sub>std</sub> + 460)

\* ppm @ O<sub>2</sub> = ppm measured x [(20.9 - O<sub>2</sub>% correction) / (20.9 - O<sub>2</sub> measured)]

\* lb/MMBtu = F-Factor x MW x [1.3711E-6 / (T<sub>std</sub> + 460)] x [20.9 / (20.9 - O<sub>2</sub>%)] x ppm

\* g/HP-hr = lb/hr x (453.59 g/lb) / HP

## REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: SP-2750-90 R.59

PAGE 2 05/21/92

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER	EXPIRATION DATE	REPLICATE ANALYSIS DATA
CYLINDER NO.:	CC40033				
Nitric Oxide	81.8 + 0.8 ppm	GMIS	Monitor Labs Model 8448 S/N 136	05/08/92 11/21/93	05/21/92 81.8 ppm
NOx	81.8 ppm	Cylinder #	Continuous		81.6 ppm 81.9 ppm
Nitrogen, O2-Free Balance		CC106651	Chemiluminescence		81.7 ppm 81.7 ppm
Cylinder Pressure: 2000 psig	@ 98.9 ppm		Last Cal Date: 03/05/92		Mean: 81.7 ppm 81.8 ppm

ppm = umole/mole

% = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.



SCOTT-MARRIN, INC.

6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507  
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS  
EPA PROTOCOL GAS MIXTURES

STEI01

TO:  
SUE POWERS  
STEINER ENVIRONMENTAL, INC.  
4930 BOYLAN ST.  
BAKERSFIELD, CA 93308-

DATE : 08/21/92

CUSTOMER ORDER NUMBER: SP-2750-90 R.70

PAGE 1

COMPONENT	CONCENTRATION (v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
CYLINDER NO.:	CC65279				
Nitric Oxide	40.0 ± 0.4 ppm	GMIS	Monitor Labs Model 8440 S/N 136	02/18/94	39.9 ppm 40.0 ppm
NOx	40.0 ppm	Cylinder #	Continuous		39.9 ppm 39.9 ppm
Nitrogen, O <sub>2</sub> -Free Balance		CC65317	Chemiluminescence		40.0 ppm 40.2 ppm
Cylinder Pressure:	2000 psig	@ 48.2 ppm	Last Cal Date: 06/02/92		Mean: 39.9 ppm 40.0 ppm

ppm = umole/mole

% = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

Analyst:

B.E. Gross

Approved:

J.T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS



SCOTT-MARRIN, INC.

6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507  
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS  
NIST TRACEABLE GAS MIXTURES

STEI01

TO:

SUE POWERS  
STEINER ENVIRONMENTAL, INC.  
4930 BOYLAN STREET  
BAKERSFIELD, CA 93308-

DATE: 05/07/92

CUSTOMER ORDER NUMBER: SP-2750-90 R.60 / Reanalysis

PAGE 1

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC7418	Nitrogen Dioxide	37.9 + 0.8 ppm	SRM 2627
	Nitrogen	Balance	
	Cylinder Pressure:	1500 psig	

ppm = umole/mole

% = mole-%

The above analysis is traceable to the National Institute of Standards and Technology by intercomparison with the reference standard listed above. Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/262491.

Analyst:

B.E. Gross

Approved:

J.T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

SCOTT - MARRIN, INC.

6531 BOX SPRINGS BLVD.

RIVERSIDE, CALIFORNIA 92507

## REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: SB-2750-90 Rel.60/Reanalysis

CYLINDER NUMBER CC91374

COMPONENT CONCENTRATION (v/v)

Carbon Monoxide	8140 ± 82 ppm	Replicate	05/06/92	8260 ppm
Nitrogen	Balance	Analysis		8190 ppm
Cylinder Pressure:	1800 psig	Data On		<u>8170 ppm</u>
		CO:	Mean	8210 ppm
				Expiration Date CO: 10/06/93

(The Carbon Monoxide analysis was performed in accordance with Section 3.0.4 of the )  
(revised EPA traceability protocol No. 1 dated June 9, 1987. The analysis is )  
(traceable to the National Institute of Standards and Technology by direct )  
(intercomparison with GMIS, cylinder number CC50047 at 9930 ppm Carbon Monoxide in )  
(Nitrogen. The analysis was performed using a Varian Model 1200 gas chromatograph )  
(with catalytic methanation/flame ionization detection. The last multipoint )  
(calibration was performed 5/5/92. )

05/07/92

SCOTT - MARRIN, INC.      6531 BOX SPRINGS BLVD.      RIVERSIDE, CALIFORNIA 92507

## REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: SP-2750-90 Rel.60/Reanalysis

---

### CHRONOLOGICAL RECORD OF CERTIFIED CONCENTRATIONS

CYLINDER NUMBER: CC91374

DATE:	Carbon Monoxide		
07/06/90	8060 ppm		
07/13/91	8160 ppm		
05/06/92	8210 ppm		

AVERAGE                                                           
                  8140 ppm



SCOTT-MARRIN, INC.

6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507  
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## REPORT OF ANALYSIS

STEIØ1

TO: SUE POWERS  
STEINER ENVIRONMENTAL INC  
4930 BOYLAN ST  
BAKERSFIELD CA 93308

DATE: 8 AUGUST 1992

CUSTOMER ORDER NUMBER: SP-2750 90 REL.67

CYLINDER NUMBER CC50672

COMPONENT CONCENTRATION (v/v)

Carbon Monoxide	3980 ± 40 ppm	Replicate Analysis	07/30/92	4000 ppm	08/07/92	3970 ppm
Nitrogen	Balance	Data On		3980 ppm		3960 ppm
		CO:	Mean	4000 ppm		3970 ppm
				3990 ppm		3970 ppm

Cylinder Pressure: 2000 psig

CYLINDER NUMBER

COMPONENT CONCENTRATION (v/v)

Replicate	07/30/92	4000 ppm	08/07/92	3970 ppm
Analysis		3980 ppm		3960 ppm
Data On		4000 ppm		3970 ppm
CO:	Mean	3990 ppm		3970 ppm
Expiration Date CO: 02/07/93				

Expiration Date CO: 02/07/93

CYLINDER NUMBER CC56876

COMPONENT CONCENTRATION (v/v)

Carbon Monoxide	3980 ± 40 ppm	Replicate Analysis	07/30/92	4000 ppm	08/07/90	3970 ppm
Nitrogen	Balance	Data On		3970 ppm		3970 ppm
		CO:	Mean	3990 ppm		3970 ppm
				3990 ppm		3970 ppm

Cylinder Pressure: 2000 psig

CYLINDER NUMBER

COMPONENT CONCENTRATION (v/v)

Replicate	07/30/92	4000 ppm	08/07/90	3970 ppm
Analysis		3970 ppm		3970 ppm
Data On		3990 ppm		3970 ppm
CO:	Mean	3990 ppm		3970 ppm
Expiration Date CO: 02/07/93				

Expiration Date CO: 02/07/93

(The Carbon Monoxide analyses were performed in accordance with Section 3.0.4 of the revised EPA traceability protocol No. 1 dated June 9, 1987. The analyses are traceable to the National Institute of Standards and Technology by direct intercomparison with GMIS, cylinder number CC7245 at 5050 ppm Carbon Monoxide in Nitrogen. The analyses were performed using a Varian Model 1200 gas chromatograph with catalytic methanation/flame ionization detection. The last multipoint calibration was performed 08/13/92.)

ANALYST

S.B. Kozy  
S.B. Kozy

APPROVED

J.T. Marrin  
J.T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.



# SCOTT-MARRIN, INC.

6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507  
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

**REPORT OF ANALYSIS**  
**NIST TRACEABLE GAS MIXTURES**

STEI01

**TO:**

Sue Powers  
Steiner Environmental, Inc.  
4930 Boylan St.  
Bakersfield, CA 93308-

DATE: 03/19/92

CUSTOMER ORDER NUMBER: SP-275A-90REI52

PAGE 1

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC97817	Carbon Monoxide	18.09 + 0.18 ppm	SRM 2613a
	Carbon Dioxide	8.68 + 0.09 %	SRM 1674b
	Oxygen	5.35 + 0.05 %	SRM 2658a
	Nitrogen	Balance	
CC73074	Carbon Monoxide	198.6 + 2.0 ppm	SRM 2636
	Carbon Dioxide	17.42 + 0.17 %	SRM 1675b
	Oxygen	7.38 + 0.07 %	SRM 2658a
	Nitrogen	Balance	

ppm = umole/mole

$\frac{g}{mole}$  = mole-%

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above. Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMRP 232.09/202481.

**Analyst:**

M.S. Calhoun

Approved:

J.T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.

## STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS



## SCOTT-MARRIN, INC.

6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507  
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

**REPORT OF ANALYSIS**  
**NIST TRACEABLE GAS MIXTURES**

STEI01

**TO:**

Sue Powers  
Steiner Environmental, Inc.  
4930 Boylan Street  
Bakersfield, CA 93308-

DATE: 04/21/92

CUSTOMER ORDER NUMBER: SP-2750-90REI57

PAGE 1

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC51157	Carbon Monoxide	82.0 + 0.8 ppm	SRM 1679c
	Carbon Dioxide	17.36 + 0.17 %	SRM 1675b
	Oxygen	7.86 + 0.08 %	SRM 2658a
	Nitrogen	Balance	
CC106775	Carbon Monoxide	48.9 + 0.5 ppm	SRM 2614a
	Carbon Dioxide	10.14 + 0.10 %	SRM 1675b
	Oxygen	4.77 + 0.05 %	SRM 2658a
	Nitrogen	Balance	
CC28045	Carbon Monoxide	44.4 + 0.4 ppm	SRM 2614a
	Carbon Dioxide	9.70 + 0.10 %	SRM 1675b
	Oxygen	2.545 + 0.025 %	SRM 2657
	Nitrogen	Balance	

ppm = umole/mole

2018-2

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above. Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

### **Analyst:**

M.S. Calhoun

Approved:

J.T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.



**SCOTT-MARRIN, INC.**  
2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507  
TELEPHONE (714) 784-1240

RECEIVED  
OCT - 7 1991  
Ans'd.....

## REPORT OF ANALYSIS

STEI#1  
TO: Sue Powers  
Steiner Environmental, Inc.  
4930 Boylan Street  
Bakersfield, CA 93308

DATE: 17 September 1991

CUSTOMER ORDER NUMBER: SP-2750-90 Rel. 37/Reanalysis

**CYLINDER NUMBER** AIM12186

**COMPONENT**      **CONCENTRATION (v/v)**

Carbon Monoxide     $151.5 \pm 1.5$  ppm

Carbon Dioxide      $15.05 \pm 0.15$  Mole-%

Oxygen                $4.05 \pm 0.04$  Mole-%

Nitrogen              Balance

**ANALYST** Mark Monson

APPROVED

M.J. Monson

J.T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.

SCOTT - MARRIN, INC.

2001 THIRD ST., UNIT H

RIVERSIDE, CALIFORNIA 92507

## REPORT OF ANALYSIS

RECEIVED  
OCT - 7 1991  
Ans'd.....

CUSTOMER ORDER NUMBER: SP-2750-90 Rel. 37/Reanalysis

CYLINDER NUMBER ALM12186

CYLINDER NUMBER \_\_\_\_\_

COMPONENT CONCENTRATION (v/v)

COMPONENT CONCENTRATION (v/v)

(The Carbon Monoxide analysis is traceable to the National Institute of Standards and Technology SRM #2636, Cylinder Number CAL1907.)

CYLINDER NUMBER ALM12186

CYLINDER NUMBER \_\_\_\_\_

COMPONENT CONCENTRATION (v/v)

COMPONENT CONCENTRATION (v/v)

(The Carbon Dioxide analysis is traceable to the National Institute of Standards and Technology SRM # 1675b, Cylinder Number CAL2823.)

CYLINDER NUMBER ALM12186

CYLINDER NUMBER \_\_\_\_\_

COMPONENT CONCENTRATION (v/v)

COMPONENT CONCENTRATION (v/v)

(The Oxygen analysis is traceable to the National Institute of Standards and Technology SRM # 2658, Cylinder Number CAL2577.)

CYLINDER NUMBER \_\_\_\_\_

CYLINDER NUMBER \_\_\_\_\_

COMPONENT CONCENTRATION (v/v)

COMPONENT CONCENTRATION (v/v)



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**REPORT OF ANALYSIS  
CALIBRATION GAS MIXTURES**

STEI01

TO: SUE POWERS  
STEINER ENVIRONMENTAL INC  
4930 BOYLAN ST  
BAKERSFIELD, CA 93308-  
DATE : 09/15/92

CUSTOMER ORDER NUMBER: SP 2750 90 R 68

PAGE 1

CYLINDER NO.: CC108780

**CYLINDER NO.:**

COMPONENT	CONCENTRATION (v/v)
Methane	20.77 + 0.21 ppm
Ethane	20.53 + 0.21 ppm
Propane	20.14 + 0.20 ppm
n-Butane	20.16 + 0.20 ppm
n-Pentane	20.40 + 0.41 ppm
n-Hexane	19.69 + 0.39 ppm
Nitrogen	Balance

ppm = umole/mole

% = mole-%

**Analyst:**

M.H.C.

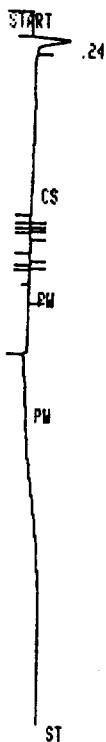
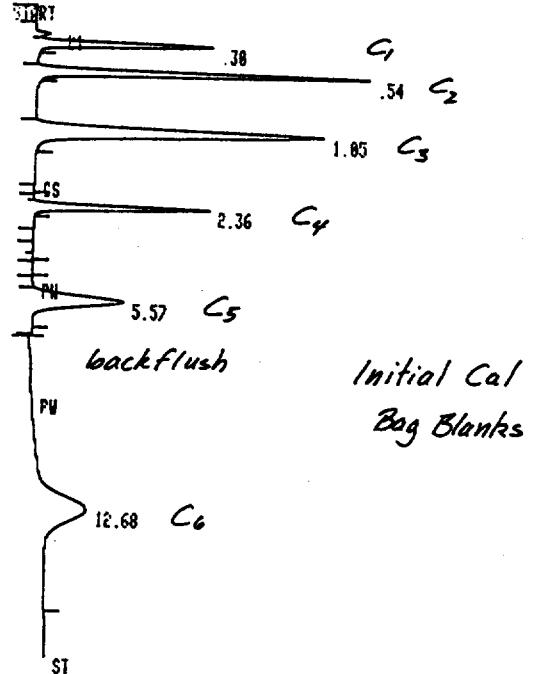
M.S. Calhoun

Approved:

J.T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.

**APPENDIX C**  
**TEDLAR BAG BAG BLANK DATA**



RUN # 1 OCT/09/92 07:47:42

AREA%			
RT	AREA	TYPE	AR/HT
0.21	197	PV	0.028
0.38	4311	VB	0.042
0.54	8581	PB	0.044
1.05	13158	BB	0.078
2.36	18177	VB	0.178
5.57	22984	BB	0.416
12.68	32937	PB	1.199

RUN # 1 OCT/09/92 09:54:58

ESTD			
RT	AREA	TYPE	CAL#
0.24	1068	PB	2

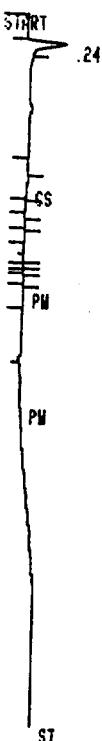
TOTAL AREA= 1000  
MUL FACTOR= 1.0000E+00

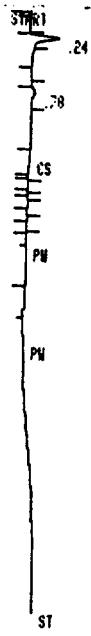
TOTAL AREA= 99285  
MUL FACTOR= 1.0000E+00

RUN # 1 OCT/09/92 07:47:42

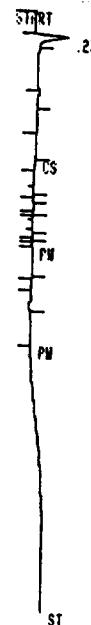
ESTD			
RT	AREA	TYPE	CAL#
0.21	197	PV	2
0.38	4311	VB	IR
0.54	8581	PB	
1.05	13158	BB	
2.36	18177	VB	
5.57	22984	BB	
12.68	32937	PB	

TOTAL AREA= 99285  
MUL FACTOR= 1.0000E+00





Blank  
Bag 3



Blank  
Bag 5

RUN # 8  
ID 3

OCT/09/92 10:38:29

ESTD

RT	AREA	TYPE	CAL#	AMOUNT
0.24	882	PB	2	4.477
0.78	247	BB		1.190 >C <sub>1</sub>

TOTAL AREA= 1129  
MUL FACTOR= 1.0000E+00

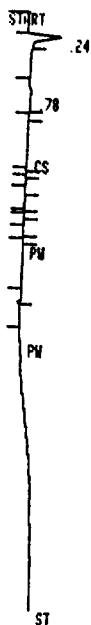
RUN # 10  
ID 5

OCT/09/92 11:24:33

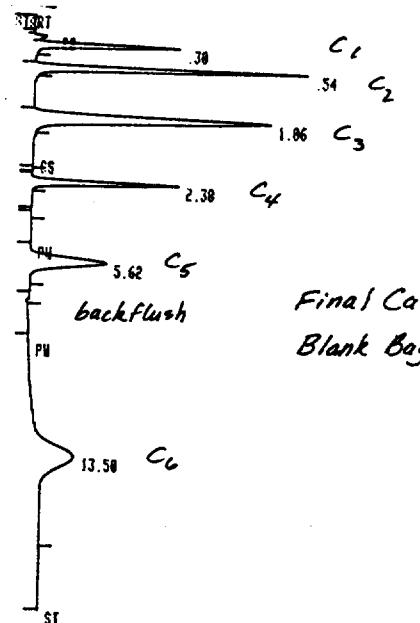
ESTD

RT	AREA	TYPE	CAL#	AMOUNT
0.23	1066	PB	2	5.411

TOTAL AREA= 1066  
MUL FACTOR= 1.0000E+00



Blank  
Bag 4



Final Cal  
Blank Bags

RUN # 9  
ID 4

OCT/09/92 11:00:02

ESTD

RT	AREA	TYPE	CAL#	AMOUNT
0.24	1135	PB	2	5.761
0.78	183	PB		0.882 >C <sub>1</sub>

TOTAL AREA= 1318  
MUL FACTOR= 1.0000E+00

RUN # 14  
ID ---

OCT/09/92 12:40:45

ESTD

RT	AREA	TYPE	CAL#	AMOUNT
0.22	281	PV	2	1.426
0.39	4266	VB	IR	29.553 C <sub>1</sub>
0.54	8345	PB		49.295
1.06	12880	BB		62.055
2.38	17985	BB		86.658
5.62	28359	BB		107.720
13.50	29921	PB		144.160

TOTAL AREA= 500.000  
MUL FACTOR= 1.0000E+00

**APPENDIX D**  
**UNIT #7 OPERATING DATA**

**Steiner Environmental, Inc.**

**INTERNAL COMBUSTION ENGINE  
COMPLIANCE DATA  
CHECK LIST**

COMPANY NAME: So. Cal. GRS	DATE: 10-12-92
MANUFACTURER: Ingersoll - Rand	TEST LOCATION: Goleta, Ca.
UNIT NO: 7 Outlet	TYPE OF CONTROL DEVICE:
UNIT MODEL NO:	CONTROL DEVICE MODEL NO:

Fuel Flow	5538
Fuel Flow Units	ACFH
Fuel Gas Pressure	1.0
Fuel Gas Pressure Units	PSIG
Fuel Gas Temperature (°F)	84
Wet Bulb Temperature (°F)	63
Dry Bulb Temperature (°F)	66
Relative Humidity (%)	85
Barometric Pressure ("Hg)	29.92
Brake Horse Power (Rated)	660
Brake Horse Power (Actual)	654
Kilowatts (Rated)	
Kilowatts (Actual)	
Revolutions Per Minute (Rated)	330
Revolutions Per Minute (Actual)	331

COMMENTS: Run 1 1200-1240

**Steiner Environmental, Inc.**

**INTERNAL COMBUSTION ENGINE  
COMPLIANCE DATA  
CHECK LIST**

COMPANY NAME: So. Cal. GRS	DATE: 10-12-92
MANUFACTURER: Ingersoll-Rand	TEST LOCATION: Goleta, Cr.
UNIT NO: 7 Outlet	TYPE OF CONTROL DEVICE:
UNIT MODEL NO:	CONTROL DEVICE MODEL NO:

Fuel Flow	5538
Fuel Flow Units	ACFH
Fuel Gas Pressure	1.0
Fuel Gas Pressure Units	PSIG
Fuel Gas Temperature (°F)	85
Wet Bulb Temperature (°F)	63
Dry Bulb Temperature (°F)	67
Relative Humidity (%)	81
Barometric Pressure ("Hg)	29.92
Brake Horse Power (Rated)	660
Brake Horse Power (Actual)	648
Kilowatts (Rated)	
Kilowatts (Actual)	.
Revolutions Per Minute (Rated)	330
Revolutions Per Minute (Actual)	331

COMMENTS: RUN 2 1345-1425

**Steiner Environmental, Inc.**

**INTERNAL COMBUSTION ENGINE  
COMPLIANCE DATA  
CHECK LIST**

COMPANY NAME: So. Cal Gas	DATE: 10-12-92
MANUFACTURER: Ingersoll-Rand	TEST LOCATION: Goleta, CA
UNIT NO: 7 Outlet	TYPE OF CONTROL DEVICE:
UNIT MODEL NO:	CONTROL DEVICE MODEL NO:

Fuel Flow	5538
Fuel Flow Units	ACFH
Fuel Gas Pressure	1,0
Fuel Gas Pressure Units	PSIG
Fuel Gas Temperature (°F)	84
Wet Bulb Temperature (°F)	63
Dry Bulb Temperature (°F)	67
Relative Humidity (%)	80
Barometric Pressure ("Hg)	29.92
Brake Horse Power (Rated)	660
Brake Horse Power (Actual)	643
Kilowatts (Rated)	
Kilowatts (Actual)	
Revolutions Per Minute (Rated)	330
Revolutions Per Minute (Actual)	331

COMMENTS: RUN 3 1435-1515